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Is There an Ocean of Difference: A Comparision of the European Community's and United States' Environmental Regulations Protecting Air and Water Quality

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TABLE OF CONTENTS

I. INTRODUCTION

The emergence of the European Community ("EC") as a regional intergovernmental organization reflects the increasing globalization of the world's economies already dominated by multinational corporations, international acquisitions, and multilateral trade agreements. The EC[1] is composed of twelve Member States[2] and represents the buying power of 342 million consumers and approximately four trillion dollars in world trade.[3] This concentration of economic power means that EC policy affects both the regional and the global economies and trade. This in turn means that the EC can affect regional and global environmental policy. The EC and its individual Member States recognize this potential impact on environmental policy. As a result, the EC has passed several pieces of environmental legislation with the goal of developing a uniform approach to regulation and enforcement.

This Comment will analyze the EC's approach to environmental policymaking by comparing it to initiatives taken by the United States. In order to thoroughly examine the EC environmental mandates, it is imperative to first understand the EC's legal framework, major institutions, and forms of legislation. Section II of this Comment will address the EC's legislative process. Section III will review the EC's approach to air pollution by examining the EC's response to the problems of ozone depletion and acid rain. Section IV will review EC initiatives directed at improving water quality. The last two sections of this comment will examine the EC's policy for deal-

1. Three treaties form the foundation of the EC: the TREATY ESTABLISHING THE EUROPEAN ECONOMIC COMMUNITY [EEC TREATY]; the TREATY ESTABLISHING THE EUROPEAN ATOMIC ENERGY COMMUNITY [EURATOM TREATY]; and the TREATY ESTABLISHING THE EUROPEAN COAL AND STEEL COMMUNITY [ECSC TREATY]. Michael S. Feeley & Peter M. Gilhuly, *Green Law-Making: A Primer on the European Community's Environmental Legislative Process*, 24 VAND. J. TRANSNAT'L L. 653, 655 n.5 (1991).

2. Belgium, France, Germany, Italy, Luxembourg, and the Netherlands were the original six Member States. Feeley & Gilhuly, *supra* note 1, at 655 n.6. Denmark, Ireland, the United Kingdom, Greece, Portugal, and Spain subsequently joined. Stefan A. Reisenfeld, *The Single European Act*, 13 HASTINGS INT'L & COMP. L. REV. 371, at 371 (1990).

3. Feeley & Gilhuly, *supra* note 1, at 654. In comparison, the United States has 247 million consumers and Japan has 122 million consumers. *Id.*

ing with these concerns and contrast these policies with the approach taken by the United States.

II. OVERVIEW OF THE EC LEGISLATIVE PROCESS

A. EC Political Institutions

The EC is a multinational treaty-based organization established with the goal of creating a common market for the free trade of goods and services.[4] The Member States vested the decision-making authority of the EC in different institutions, each of which has a role in drafting and developing legislation. These institutions include: the European Commission ("Commission"), the European Council ("Council"), the European Parliament ("Parliament"), and the European Environmental Agency ("EEA").

The Commission serves as the EC's executive branch and is primarily responsible for ensuring "the proper functioning and development of the common market."[5] Specifically, the Commission's responsibilities include: "(i) proposing legislation; (ii) implementing [EC] policies; (iii) enforcing the provisions of the EC Treaties; and (iv) drafting and submitting proposals for new EC rules to the Council."[6] The Commission may also review decisions of the European Parliament and may "amend or withdraw any proposal under

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4. *Id.* at 655-56. The trade alliance is the culmination of the EC's 1992 Project. *Id.* This Project is

> the product of the European Commission, established in January 1985 under the Presidency of Jacques Delors of France. The Commission's White Paper embodies the project that sets forth the concept of one large, internal European market and establishes a comprehensive program to achieve that goal. The Community's main purpose is to create an economic community by establishing a common market that allows goods, services, and capital to move with ease across national borders. Completion of the final steps towards this integration should occur by the end of 1992. The Commission recently concluded that ninety percent of the directives that have reached their deadlines have been transposed into Member States' national law.

Id. at 656 (footnotes omitted).

The EC Treaty formally went into effect on November 1, 1993. The final barrier to implementation of the Treaty was removed by the German constitutional court. Boris Johnson, *Foggy Dawn to the Age of Maastricht*, DAILY TELEGRAPH, Nov. 1, 1993, at 11; *see also*, Andrew Borowiec, *"Cruel Economic Reality" Drives EC Future*, WASH. TIMES, Nov. 1, 1993, at A11. For a list of the treaties forming the foundation of the EC, see *supra* note 1. For a list of the countries comprising the EC, see *supra* note 2.

5. EEC TREATY art. 155.

6. Feeley & Gilhuly, *supra* note 1, at 658.

consideration at any time during the legislative process prior to final passage."[7]

The Council is the EC's primary legislative body.[8] The Council "adopts, revises, or rejects the Commission's proposals."[9] Member States each have one voting representative on the Council.[10] Because Council representatives also hold prominent national positions within their respective countries' governments, the Council delegates much of its legislative functions to an assisting committee, the Committee of Permanent Representatives.[11]

The authority the Council does retain is limited. Council members may vote only on those proposals submitted by the Commission and[12] the Council must consult with the Parliament on all proposed legislation.[13] The Parliament is directly elected and is independent of the Member States. It is not, however, independent of politics. Instead of representing an individual Member State, Parliament members represent one of the EC's nine political parties.[14] The Parliament primarily serves as an advisor on legislative matters.[15] It may, however, reject legislation drafted by the Council; only a unanimous vote by the Council can override the Parliament's decision.[16] The Parliament also has tremendous input into

7. *Id.* at 659 (citing AUDREY WINTER ET. AL., EUROPE WITHOUT FRONTIERS: A LAWYER'S GUIDE 25, at 45 (2d ed. 1989)).

8. Feeley & Gilhuly, *supra* note 1, at 660.

9. *Id.*

10. *Id.* at 661.

11. *Id.* The twelve Member States each appoint a permanent ambassador to the Committee whose collective responsibility it is to review all EC legislation. *Id.*

12. *Id.* at 662 (citing WINTER, *supra* note 7, at 30).

13. Feeley & Gilhuly, *supra* note 1, at 662. Some problems arise because Parliament now has significant opportunities to delay passage of legislation through the Council simply by ignoring it. Furthermore, Council's ability to pass controversial legislation, including environmental legislation, is limited because many Treaty articles—and all matters of "extreme importance" to any Member State—require unanimity to pass. Therefore, the actual Council vote tends to require cooperation and a series of political compromises. In recent years, however, this limitation has eased somewhat with the increased use of qualified majority voting and the increasing dominance of progressive states such as Germany, Denmark, and the Netherlands on environmental legislation.

Id. (footnotes omitted).

14. *Id.* at 663. "At present, ten groups of Parliament exist, with the largest being the Socialists, but since agreement requires 260 of the 518 votes, forming political alliances is generally necessary." *Id.* at 663 n.68.

15. *Id.* at 663-64.

16. *Id.* at 664. The Parliament's role, however, is growing.

The real test of Parliament in the future will be in its ability to exploit its political powers and opportunities in a Community that, as a result of EMU [Economic and Monetary Union] and the movement toward a com-

the budgetary process, thus providing it with the "power of the purse-strings."[17]

The EC has also delegated certain responsibilities to the European Environmental Agency ("EEA"). The EEA's role is to "'collect environmental data from EC Member States and disseminate that information to interested parties, including governments and private entities.'"[18] Through the EEA, the EC provides Member States free access to environmental information with the hope of strengthening policymaking efforts and subsequent enforcement efforts by individual Member States.[19] The EC's own constitutional structure, however, is poorly designed to address environmental issues, especially in the area of enforcement.[20] Because implementation of all

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mon foreign and security policy, will engage in more and more actions of a political rather than legislative character. Here, too, the new treaty will help, by providing Parliament with stronger rights to demand testimony and to supervise the management of EC policies, particularly in the financial sphere. Parliament will also play a role in the appointment of the Commission. The Council will continue to nominate the president and other commissioners, but it will be obliged to consult Parliament, and once the choice is made, to submit the Commission as a whole for parliamentary approval. Only when Parliament has given approval will the Commission be able to enter into office.

Peter Ludlow, *Europe's Institutions: Europe's Politics, in* THE SHAPE OF THE NEW EUROPE 59, 81-82 (Gregory F. Treverton ed., 1991).

17. Ludlow, *supra* note 16, at 82.

18. Feeley & Gilhuly, *supra* note 1, at 667 (quoting David P. Hackett & Elizabeth E. Lewis, *European Economic Community: Environmental Requirements in* THE EUROPEAN ECONOMIC COMMUNITY: PRODUCTS LIABILITY RULES AND ENVIRONMENTAL POLICY 253, 257 (Patrick E. Thieffry & G. Marc Whitehead eds., 1990)).

19. *Id.*

20. Ludwig Kramer, *The European Economic Community, in* UNDERSTANDING US AND EUROPEAN ENVIRONMENTAL LAW: A PRACTITIONER'S GUIDE 4, 5 (Turner T. Smith & Pascale Kromarek eds., 1987) [hereinafter PRACTITIONER'S GUIDE]. Ludwig Kramer of the Commission of European Communities, summarized the problem as follows:

> The EEC has a poor constitution for lawmaking in environmental matters. The EEC Treaty, which is our constitution, does not even yet have the word "environment" in its articles. This might change in the future, when the amendment to the EEC Treaty - the Single Act - comes into force, but it is not yet there. We do not have a government inside the EEC comparable to the United States federal government. We do not have a parliament with parliamentary powers inside the EEC, such as the Congress in the United States. We do not have an EEC public opinion, no EEC television, no EEC radio, no EEC press, no scholars who think EEC. Scholars come from nation states and think national first of all.
>
> Decision-making for environmental rules, as for most other rules, is based on the unanimity in the Council of Ministers, which is composed of ministers from the twelve Member States. The law-making itself consists of directives that are binding, but which have to be transformed into national law by an act of legislation by the twelve sovereign nation states. They are bound to do so, but how they do it, and to what extent, is very much left to their discretion. The EEC, unlike the United States, is not

directives is left to individual Member States and the EC's oversight resources are limited, direct enforcement by EC agencies is only marginal.[21] In addition, the EEA's role is narrowly tailored to serve only as an information exchange for the Member States.[22]

B. Forms of EC Legislation

The EC promulgates legislation in three forms. First, there are general rulings or decisions which apply only to a particular Member State and usually involve a violation of an EC law or Treaty.[23] Second, there are regulations that provide a broad, policy-based statement of the law for the entire EC.[24] These regulations are almost always directed at areas in which EC law supersedes that of the Member States.[25] The third form of EC legislation are directives that require Member States to enact implementing laws.[26] The im-

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an owner of land. . . . We have no resources in property, we have almost no tax powers at the EEC level.

Thus, when our politicians discovered the need for, or the usefulness of, making EEC environment policy in the early seventies, it was a political case. It was not the implementation of anything that was imposed or prescribed by the EEC Constitution.

Id.

21. For a discussion of EC problems in effectuating enforcement, see *infra* note 30 and accompanying text.

22. Feeley & Gilhuly, *supra* note 1, at 667. Ludwig Kramer of the Commission of European Communities stated that "[t]he EEC Commission is facing considerable difficulty in compiling, handling, and using scientific and technological data. Each country has a tendency to keep its own data jealously secret. There is a lot of diffidence across the frontier, and the fear of distortion of competition certainly exists in Western Europe." Kramer, PRACTITIONER'S GUIDE, *supra* note 20, at 7.

23. Feeley & Gilhuly, *supra* note 1, at 668.

24. *Id.*

25. *Id.*

[Regulations] operate essentially like national laws, except that they apply directly to every Member State and citizen of the EC. As direct law, regulations are legally self-sufficient, and compliance may be enforced through actions brought directly before the ECJ [European Court of Justice]. The EC, however, does not favor the use of regulations. The EC usually issues regulations in areas directly governed by Community policies, like agriculture, antitrust, or antidumping laws. While the EEC Treaty permits the use of regulations in environmental law, they have rarely been used to address environmental concerns.

Id. (footnotes omitted).

26. *Id.*

Almost all of the Community's legislation on the environment is in the form of directives, as this is the form that most easily enables a balance to be struck between harmonization and flexibility. It specifies the objectives and principal obligations laid on Member States, but it does not prescribe everything in detail, since the diversity of laws, practices, and environmental conditions requires that each Member State have a degree of discretion in applying a directive to its own situation.

plementation of EC directives is left to the respective governments of the individual Member States.[27]

Enforcement of all EC mandates is traditionally left to the Member States.[28] After the adoption of the particular legislation, the EC's role is primarily one of overseeing Member States' enforcement.[29] However, although the EC has been effective in getting Member States to adopt legislation, subsequent follow-up of individual Member States' enforcement has been difficult.[30]

III. AMBIENT AIR QUALITY

The effects of air pollution are obvious across the globe in every region. As a first step towards combating the global problems of pollution, most developed countries agree that a concerted, international effort must be made.[31] Independent national action, although admirable, is insufficient because an individual nation's air pollution is not solely the result of that nation's past pollution practices.[32]

This section will address two of the most serious problems of air pollution: ozone depletion and acid rain. First, this section will identify the global effects of ozone depletion and acid rain. Second, it will discuss the initiatives taken by the EC to confront these problems. Finally, this section will compare the EC approach to actions taken by the United States to address these problems.

Myles McSwiney, *The European Community Perspective, in* PRACTITIONER'S GUIDE, *supra* note 20, at 133-34.

27. Feeley & Gilholy, *supra* note 1, at 668-69.

28. *Id.* at 670-71.

29. *Id.*

30. *Id.*

31. For a full discussion of the multinational approach to ozone protection, see *infra* notes 48-75 and accompanying text.

32. For a discussion of the global effects of pollution on the ozone layer, see *infra* notes 39-47 and accompanying text.

A. Ozone Depletion

1. International Nature of the Crisis

A twenty-mile band of stratosphere[33] surrounds the earth absorbing much of the harmful ultraviolet solar radiation.[34] Since 1969, the ozone layer of the stratosphere has decreased over all regions of the globe.[35] For example, each year during spring, Antarctica suffers a fifty percent reduction in the ozone layer creating what many scientists refer to as a "hole."[36]

Ozone occurs naturally in the earth's stratosphere.[37] It is composed of three oxygen atoms (O_3), and results from the combination of a regular oxygen molecule (O_2) and a stray oxygen atom (O_1) found in catalytic gases. This composition makes ozone very unstable and, consequently, it is easily destroyed by a number of different chemical reactions.[38] Seventy percent of the ozone destruction is naturally occurring and is balanced out against the naturally occurring creation of ozone.[39] The remainder of the destruction results from human activities such as the use of various

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33. The stratosphere begins approximately ten miles above the earth's surface and extends outward to approximately thirty miles. Wendy J. Simpson, Comment, *The Problem of Ozone Depletion—Is There an International Legal Solution?*, 12 N.C. J. INT'L L. & COM. REG. 433, 434 (1987).

34. Joel A. Mintz, *Keeping Pandora's Box Shut: A Critical Assessment of the Montreal Protocol on Substances that Deplete the Ozone Layer*, 20 U. MIAMI INTER-AM. L. REV. 565, 566-67 (1989).

35. From 1969 to 1988, ozone depletion in the northern hemisphere was between 1.7% and 3% Barbara Rosewicz, *New Ozone Study Shows Depletion Exceeds Estimates*, WALL ST. J., Mar. 16, 1988, at 58, col. 4. Other research has

> revealed that since 1969 the ozone layer has thinned by as much as 3 percent in the latitudes spanning much of the United States, Canada, Western Europe, the Soviet Union, China and Japan; the loss was more than 6 percent over parts of Alaska and Scandinavia in winter months. The findings were three times worse than expected — and they were hardly academic.

Melinda Beck & Mary Hager, *More Bad News for the Planet*, NEWSWEEK, Mar. 28, 1988, at 63.

36. Richard S. Stolarski, *The Antarctic Ozone Hole*, 258 SCI. AM. 30, 36 (Jan. 1988). The chemicals responsible for causing the ozone depletion tend to accumulate at the polar vortex during the spring, which accounts for the disproportionate effect on the Antarctic. *Id.*

37. *Id.* Researchers have found that "[i]n the stratosphere, ozone molecules are formed when solar ultraviolet rays collide with ordinary oxygen molecules. These collisions create free oxygen atoms that recombine with ordinary oxygen molecules to form ozone molecules. Unlike ordinary oxygen molecules, the ozone molecules can absorb solar ultraviolet radiation . . . ." *Id.* at 262-63.

38. John W. Kindt & Samuel P. Menefee, *The Vexing Problem of Ozone Depletion in International Environmental Law and Policy*, 24 TEX. INT'L L.J. 261, 263 (1989).

39. Michael D. Ehrenstein, Comment, *A Moralistic Approach to the Ozone Depletion Crisis*, 21 INTER-AM. L. REV. 611, 615 (1990).

industrial chemicals; the worst offenders are halocarbons.[40] The two types of halocarbons that cause the most damage to the ozone layer are chlorofluorocarbons ("CFC"s) and halons.[41] These compounds do not break down in the lower atmosphere as do other compounds.[42] Rather, they rise into the stratosphere where the sun's radiation breaks them apart releasing chlorine and bromine atoms.[43] These atoms then react with the ozone molecules.[44] There are no national or regional boundaries in the stratosphere; compounds released into the air over one area can cause the destruction of ozone over another area.[45]

If it continues, ozone depletion will have drastic effects, both directly and indirectly, on life on the planet. The United States

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40. Kindt & Menefee, *supra* note 38, at 263. Other trace gases thought to result in ozone destruction include: methane (CH_4), nitrous oxide (N_2O), nitrogen oxide (NO_x), source gases for stratospheric sulfate aerosols (OCS, CS_2), carbon monoxide (CO) and carbon dioxide (CO_2). *Id.* at 263 (citing WORLD METEOROLOGICAL ORG., ATMOSPHERIC OZONE 1985 (GLOBAL OZONE RESEARCH AND MONITORING PROJECT, REPORT NO. 16)).

41. Douglas H. Ogden, Comment, *The Montreal Protocol: Confronting the Threat to Earth's Ozone Layer*, 63 WASH. L. REV. 997, 999 (1988).

42. Steven J. Shimberg, *Stratospheric Ozone and Climate Protection: Domestic Legislation and the International Process*, 21 ENVTL. L. 2175, 2182 (1991).

43. Shimberg, *supra* note 42, at 2182. The problem occurs because

> [t]he persistent, stable compounds of CFCs, methyl chloroform, carbon tetrachloride, and HCFCs all contain one or more chlorine atoms. Halons are also persistent, stable compounds that remain intact until they reach the stratosphere. Although halons do not contain chlorine atoms, they do contain bromine atoms. Bromine, like chlorine, reacts with and destroys ozone.

Id. at 2182 n.28.

44. Ehrenstein, *supra* note 39, at 615. The reaction occurs because

> [o]nce in the atmosphere, shortwave radiation from the sun breaks chlorine atoms away from the CFC molecules. Free chlorine atoms react with an unstable ozone molecule, attracting ozone's third oxygen atom, decomposing the ozone molecule into a more stable, though less protective, common oxygen (O_2) molecule and a chlorine monoxide radical (ClO). When the molecule of chlorine monoxide confronts a free oxygen atom, a new oxygen molecule (O_2) and a chlorine radical (Cl) are formed. This process triggers a chain reaction in which one free chlorine atom and the numerous reactions it catalyzes can destroy 100,000 ozone molecules. Thus, the annual release of approximately one million tons of CFCs into the atmosphere, in conjunction with the enormous destructive capacity of each chlorine atom, accounts in large part for most global ozone depletion.

Id. at 615-16. (footnotes omitted).

45. *Id.* at 616 n.23 (citing Brodeur, *Annals of Chemistry: In the Face of Doubt*, NEW YORKER, June 9, 1986, at 80). F. Sherwood Rowland, Professor of Atmospheric Chemistry at the University of California at Irvine, stated that "chlorofluorocarbon molecules, no matter where they are released, disperse very quickly throughout the atmosphere, and that emission in Europe, say, will sweep across Asia and the Pacific and reach the California coast in about a month . . . ." *Id.*

Environmental Protection Agency ("EPA") estimates that, absent a reduction in the present level of CFCs, there will be an additional 153 million nonmelanoma skin cancer cases among people presently living or born before 2075; three million of these cases will be fatal.[46] In addition, a reduction in the ozone layer may cause a reduction in the human immune system's capacity, as well as threaten plant and aquatic life.[47]

2. *EC Initiatives*

The EC first attempted to deal with the problem of ozone depletion by ratifying the Montreal Protocol on Substances that Deplete the Ozone Layer in 1987.[48] The Montreal Protocol contains four provisions aimed at reducing the levels of CFCs in the atmosphere.[49] The most important provison is Article 2, which originally placed a freeze on the production of CFCs at 1986 levels.[50] Article

46. Protection of Stratospheric Ozone, 52 Fed. Reg. 47489, 47494 (1987). The National Academy of Sciences "estimates that a 1% drop in ozone levels could cause 10,000 more cases of skin cancer a year in the U.S. alone . . . ." Michael D. Lemonick, *The Heat is On: Chemical Wastes Spewed Into the Air Threaten the Earth's Climate*, TIME, Oct. 19, 1987, at 59-60; *see also* Sara R. Nichols, *A View From the Trenches*, 3 VILL. ENVTL. L.J. 323 (1992).

47. Kindt & Menefee, *supra* note 38, at 265 (citing Taubes & Chen, *Made In the Shade?*, DISCOVER, Aug. 1987, at 62, 64). That

> ultraviolet light causes skin cancer in humans is well known. The wavelengths screened by ozone happen to be precisely the wavelengths absorbed by DNA. When the radiation is absorbed, it turns to heat, which can damage or destroy cells.
>
> Less well understood, but long suspected, is that organisms living near the ocean surface may be killed in minutes by increased ultraviolet light, and farm crops, too, can be harmed. Scientists have been testing these effects in experiments . . . .

James Gleick, *Hole in Ozone Over South Pole Worries Scientist*, N.Y. TIMES, July 29, 1986, at C1.

48. Montreal Protocol on Substances that Deplete the Ozone Layer, Final Act, Sept. 16, 1987, 26 I.L.M. 1541 (1987) [hereinafter Montreal Protocol]. In 1988, the EC formally adopted the provisions of the initial Montreal Protocol in Council Regulation 3322/88. 1988 O.J. (L 297) 1.

49. *Id.* at 1552-56. Article 2 of the Montreal Protocol initially froze and then phased-out the production of CFCs and halons. *Id.* at 1552-54.

50. *Id.* While the timetable for the freeze taking effect varied depending upon the classification of the compound, this was the first international attempt to restrict production of these selected substances. Jeff Trask, *Montreal Protocol Noncompliance Procedure: The Best Approach to Resolving International Environmental Disputes?*, 80 GEO. L.J. 1973, 1979 (1992).

The other three Articles of the Montreal Protocol that deal with the reduction of CFCs are Articles 4, 5, and 6. Article 4 controls trade between signors of the Protocol and non-parties to the Treaty. Montreal Protocol, *supra* note 48, at 1554-55. Article 5 encourages the assistance of lessor developed countries (LDCs), both in technology to assist in the transition away from the use of ozone depleting chemicals and in initially encouraging the LDCs to become parties to the Treaty. *Id.* at 1555-56. Finally, Article 6 provides for the terms of the Protocol to be reas-

2 then mandated that all ratifying countries were to have reduced production of certain ozone depleting chemicals[51] to eighty percent of their respective 1986 levels of production, by 1993.[52] Furthermore, by 1999, the production of these chemicals were to be reduced by an additional thirty percent of the 1986 levels.[53]

Further research by scientists in many of the ratifying countries demonstrated that the cuts mandated by the Montreal Protocol were insufficient because of the large quantities of ozone-depleting chemicals already present in the atmosphere.[54] In light of this new research, both the EC and other signers of the Montreal Protocol resolved to take further steps to tighten the production and consumption of these chemicals. As a result, in 1990, nations attending the Second Meeting of the Montreal Protocol Nations pushed forward the phaseout so as to eliminate *all* use and production of CFCs by the year 2000.[55] The Amendments to the Montreal Protocol were due to take effect on January 1, 1992, pending ratification by a minimum of twenty parties to the Montreal Protocol.[56] On August 10, 1992, the United Nations Office of Legal Affairs reported that the amendments to the Montreal Protocol went into effect under Article 2, Paragraph 1 of the Amendments. As of October 13, 1993,

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sessed every four years "on the basis of available scientific, environmental, technical and economic information." *Id.* at 1556.

51. These substances include CFC-11, CFC-12, CFC-113, CFC-114 and CFC-115. Montreal Protocol, *supra* note 48, Annex A, 26 I.L.M. at 1561.

52. Montreal Protocol, *supra* note 48, art. II, 26 I.L.M. at 1552-54.

53. *Id.*

54. Kindt & Menefee, *supra* note 38, at 287-88. Research demonstrated the increased damage to the ozone layer when

> [i]n March of 1988 the Ozone Trends Panel reported that the ozone losses within the Antarctic ozone hole during the winter of 1987 were larger than had been anticipated. This unexpectedly large decrease in ozone levels prompted investigators to rethink their predictions that little additional ozone loss would occur if there was an acceptance of the CFC global production limits established in the 1987 Ozone Protocol [Montreal Protocol]. With regard to the nexus between the Antarctic ozone hole and CFCs, one panel member noted that a smoking gun *had* been found.

Id. at 287 (footnotes omitted). "The Ozone Trends Panel is sponsored by NASA, NOAA, the Federal Aviation Administration (FAA), the World Meteorological Organization (WMO), and the United Nations Environment Programme (UNEP)." *Id.* at 287 n.222 (citing Richard A. Kerr, *Stratospheric Ozone is Decreasing*, 239 SCIENCE 1489, 1489 (1988)).

55. Trask, *supra* note 50, at 1979.

56. *Id.* at 1974 n.6.

a total of 67 nations had signed the amendments to the Montreal Protocol.[57]

After ratifying the Montreal Protocol, the EC quickly recognized that its the provisions fell far short of the effort needed to significantly reduce the level of ozone depleting chemicals in the atmosphere.[58] The EC also recognized that the limits and scope of previous Council regulations and directives were insufficient to effectively protect the ozone layer. Therefore, the EC passed Council Regulation 594/91[59] which places severe restrictions on the use and transfer of ozone depleting substances.[60] The scope of Regulation 594/91 is broader than previous EC mandates; it increases the number of substances it controls as well as expands its means of control.[61] The Regulation extends not only to production, but also to importation, exportation, and use of CFCs and other halons, carbon tetrachloride, and 1,1,1-trichloroethane.[62] In addition, this Regulation initially placed restrictions on the importation and exportation of "controlled substances"[63] and required all importers of controlled substances to be licensed.[64] Beginning January 1, 1993,

57. Telephone Interview with Secretariat Staff Members, Treaty Section, Office of Legal Affairs, United Nations, New York, N.Y. (Oct. 13, 1993) (presently the United Nations' policy is not to permit identification of staff members).

58. *See* Council Regulation 594/91 on Substances that Deplete the Ozone Layer, 1991 O.J. (L 67) 1, 7 [hereinafter Council Regulation 594/91].

59. The Council adopted this Regulation on March 4, 1991.

60. *Id.*

61. *Id.* Council Regulation 594/91 specifies that Council Decisions 80/372 and 82/795 which extend limits only to CFC 11 and CFC 12 are insufficient to protect the ozone. *Id.* Council Regulation 594/91 is intended to expand protection.

62. Council Regulation 594/91, *supra* note 58, art. 1, at 2.

63. *Id.* art. 2, at 3. The Regulation defines "controlled substances" as "chlorofluorocarbons, other fully halogenated chlorofluorocarbons, halons, carbon tetrachloride and 1,1,1-trichloroethane, whether existing alone or in a mixture. This definition shall not cover any controlled substance which is in a manufactured product other than a container used for transportation or storage of that substance . . . ." *Id.* at 2.

64. *Id.* art. 4, at 2-3. Regulation language requiring license provides:

1. The release into free circulation in the Community of controlled substances which are subject to the quotas referred to in Article 3 shall be subject to presentation of an import license. This license shall be issued by the Commission. The Commission shall forward a copy of this license to the competent authority of the Member State into which the importation is expected to take place. To this end, each Member State shall determine its competent authority.
2. A request for a license shall contain:
   (a) the name and address of the importer;
   (b) the description of each substance stating:
      —the commercial description,
      —the heading in the combined nomenclature,
      —the country from which the substance is imported;

however, all exportation of controlled substances to Member States who are not parties to the Montreal Protocol is now strictly prohibited.[65] In addition, the importation of products containing controlled substances from non-Party Members also became strictly prohibited on January 1, 1993.[66]

Under Regulation 594/91, the total phase-out schedule for the production and use of controlled substances is much shorter than that of the Montreal Protocol. The Regulation prohibits the production of CFCs[67] and other fully halogenated CFCs[68] by Member States after June 30, 1997.[69] The Regulation also prohibits the pro-

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(c) statement of the quantity of each substance to be imported in tonnes; and

(d) the place and date of the proposed importation, if known.

Id.

65. *Id.* art. 8, at 3. Article 8 controls the exportation of controlled substances to non-parties and states, "[w]ith effect from 1 January 1993, the exportation from the Community of virgin, recycled or used controlled substances to any non-Party shall be prohibited." *Id.* Party in this case refers to a signatory of the amended Montreal Protocol. *Id.* art. 2, at 2.

66. Council Regulation 594/91, *supra* note 58, art. 6, at 3. Article 6 states:

1. [T]he release into free circulation in the Community of products imported from non-Parties containing chlorofluorocarbons or halons shall be prohibited with effect from 1 January 1993.
2. [T]he release into free circulation in the Community of products imported from non-Parties containing other fully halogenated chlorofluorocarbons, carbon tetrachloride or 1,1,1-trichloroethane shall be prohibited with effect from 1 January 1996.

Id.

67. CFCs are a Group 1 substance which includes CFC-11, CFC-12, CFC-113, CFC-114 and CFC-115. *Id.* art. 2, annex 1, at 2, 9.

68. "Other fully halogenated chlorofluorocarbons" are defined as Group 2 substances which includes CFC-13, CFC-111, CFC-112, CFC-211, CFC-212, CFC-213, CFC-214, CFC-215, CFC-216 and CFC-217 as well as their isomers. *Id.* art. 2, annex 1, at 2, 9.

69. *Id.* art. 10, at 3-4. CFCs are being phased out by measuring current production against that amount produced in the year 1986. *Id.* By January 1, 1993, CFC production cannot exceed 50% of the 1986 levels of production. *Id.* art. 10, at 4. By January 1, 1995, production may not exceed 32.5% of the 1986 production levels. *Id.* By January 1, 1996, production may not exceed 15% of the 1986 production levels. *Id.* By January 1, 1997, production may not exceed 7.5% of the 1986 production levels. *Id.*

The phaseout of other fully halogenated CFCs is measured against the 1989 baseline year of production. *Id.* By January 1, 1992, producers had to reduce their 1989 levels of production by 50%. *Id.* By January 1, 1995, production levels must be reduced to 32.5% of baseline levels. *Id.* By January 1, 1996, levels may not exceed 15% of 1989 levels. *Id.* By January 1, 1997, producers may not exceed 7.5% of the 1989 levels of production. *Id.* There shall be no production of CFCs or other fully halogenated CFCs after June 30, 1997. *Id.* The Commission will permit production after this period only "if adequate alternatives or recycled chloroflourocarbons are not available." *Id.* The identical language exists for the continued production of other fully halogenated CFCs. *Id.*

duction of halons[70] after December 31, 1999.[71] Production of carbon tetrachloride[72] is prohibited after December 31, 1997 and 1,1,1-trichloroethane[73] after December 31, 2004.[74] In addition, the Regulation includes similar phaseouts regarding the use of controlled substances by individual Member States.[75] The goal of the more abbreviated timetable behind Regulation 594/91 is to purge the EC market of all controlled substances by the year 2005 and many of the more harmful substances even sooner.

3. Comparison with United States' Regulation

Title VI of the United States' Clean Air Act ("CAA") is the principal legislation regulating the protection of the ozone layer.[76] Although the United States ratified the Montreal Protocol and its Amendments, Congress enacted Title VI of the CAA to accelerate the phaseout of CFCs, halons and methyl chloroform (1,1,1-

70. "Halons" are defined as Group 3 substances which include halon-1211, halon-1301 and halon-2402 and their isomers. Council Regulation 594/91, *supra* note 58, art. 2, annex 1, at 2, 9.

71. *Id.* art. 10, at 4. The Regulation states that "each producer shall ensure that . . . the calculated level of its production of halons in the period 1 January to 31 December 1992, and in each 12-month period thereafter, does not exceed the calculated level of its production of halons in 1986." *Id.*

By January 1, 1995, each producer may not exceed 50% of its 1986 levels of production of halons. *Id.* The Regulation prohibits completely the production of halons after December 31, 1999. *Id.* The Commission may permit continued production if no adequate alternative exists. *Id.*

72. Carbon tetrachloride is a specific substance rather than a group of chemicals. Carbon tetrachloride is the sole element of Group 4. *Id.* art. 2, annex 1, at 2, 9.

73. The chemical 1,1,1-trichloroethane, like carbon tetrachloride, is a specific substance rather than a group of chemicals; 1,1,1-trichloroethane is the sole element of Group 5. *Id.*

74. Council Regulation 594/91, *supra* note 58, art. 10, at 4-5. The Commission measures the phaseout of carbon tetrachloride against baseline 1989 production levels. *Id.* art. 10, at 4. By January 1, 1992, carbon tetrachloride production could not exceed 50% of the 1989 levels of production. *Id.* By January 1, 1995, production may not exceed 15% of the 1989 production levels. *Id.*

The phaseout of 1,1,1-trichloroethane is measured against the 1989 baseline year of production. *Id.* at 5. By January 1, 1995, producers must cut their levels of production by 30% of the 1989 production levels. *Id.* By January 1, 2000, production levels must be reduced to 30% of baseline levels. *Id.* There shall be no production of carbon tetrachloride and 1,1,1-trichloroethane by Member States after December 31, 2004. *Id.* The Commission will permit production of carbon tetrachloride after this period only if adequate alternatives are not available. *Id.*

75. *Id.* art. 11, at 5-7. Article 11 provides similar phaseout schedules for the consumption of CFCs, other fully halogenated CFCs, halons, carbon tetrachloride, and 1,1,1-trichloroethane. *Id.*

76. Clean Air Act, §§ 101-618, 42 U.S.C. §§ 7401-7671q (1988 & Supp. III 1991). Title VI was enacted pursuant to the Clean Air Act Amendments of 1990, Pub. L. No. 101-549, 104 Stat. 2399 (1990) (codified at 42 U.S.C. §§ 7671-7671q (Supp. III 1991)).

trichloroethane).[77] Title VI is analogous to EC Council Regulation 594/91. However, the phaseout provisions of the CAA[78] in certain classes of substances are at best equal to the EC legislation, and in many cases, the CAA measures are less stringent.[79]

The greatest phaseout difference between Title VI and Regulation 594/91 is the phaseout provision covering the halons. The United States permits the use of halons until the year 2015,[80] and United States companies may produce halons for global distribution up until the year 2030.[81] In contrast, the EC prohibits both the use and production of halons after December 1999.[82] While halons constitute only one class of substances[83] regulated under both provisions, the harmful effect of halons on the ozone layer is up to ten times the impact of any other substance regulated under either provision.[84]

Although the CAA prohibits production of halons after 2030 for global distribution, it permits the continued production of halons after 2030 for transfer to lesser developed countries

77. Shimberg, *supra* note 42, at 2176-78.

78. CAA § 601, 42 U.S.C. § 7671.

79. Council Regulation 594/91, *supra* note 58, at 1. For a discussion of Council Regulation 594/91, see *supra* notes 59-75 and accompanying text.

80. CAA § 605, 42 U.S.C. § 7671d. The United States' phaseout of halons does not effectively begin until the year 2015, when it becomes "unlawful for any person to produce any class II substance in an annual quantity greater than the quantity of such substance produced by such person during the baseline year." CAA § 605(b)(1), 42 U.S.C. § 7671d(b)(1). The United State's baseline year for halons is the calendar year 1986. CAA § 601(2)(A), 42 U.S.C. § 7671(2)(A). The United States' Group II includes an identical list of substances as found in the EC's Group III. CAA § 602, 42 U.S.C. § 7671a.

81. CAA § 605(b)(2), 42 U.S.C. § 7671d(b)(2). Between 2015 and 2030, the United States may maintain its 1986 levels of production. *Id.*

82. Council Regulation 594/91, *supra* note 58, at 4. For a discussion of the EC's scheduled phaseout of halons, see *supra* notes 70-71 and accompanying text. For a discussion of the threat halons pose to the ozone layer, see *supra* notes 41-47 and accompanying text.

83. Compare United States and EC classification of ozone depleting substances: The United States and the EC list CFCs as their respective Group I. The United States lists halons as Group II, while the EC list them as Group III. The United States lists the other fully halogenated CFCs as Group III, while the EC lists them as Group II. Both the United States and the EC list carbon tetrachloride as Group IV. United States' Group V (methyl chloroform) is the same as the EC's Group V (1,1,1-trichloroethane). *See* Council Regulation 594/91, *supra* note 58, Annex 1, at 9; CAA § 602, 42 U.S.C. § 7671a.

84. Montreal Protocol, *supra* note 48, at 1561. Halon-1301 has been estimated and is assumed to have ten times the ozone depleting potential of any of the Group I or II substances.

Id. The EC adopted this presumption in Council Regulation 594/91. Council Regulation 594/91, *supra* note 58, Annex 1, at 9. The United States adopted this presumption in Title VI of the CAA. CAA § 602(e), 42 U.S.C. § 7671a(e).

("LDC"s).[85] The Montreal Protocol requires the developed nation signatories to work intensively with the LDCs to provide alternative technologies that do not require the use of ozone depleting substances.[86] Under the CAA, the United States may unilaterally determine whether an LDC is complying with the Montreal Protocol.[87] In constrast, the EC permits an exception authorizing Party members to trade with LDCs[88] as long as a majority of Protocol Party Members determine the LDCs are complying with key provisions of the Montreal Protocol.[89]

The EC legislation also goes further than the CAA because it requires more immediate and substantial cuts aimed at eliminating carbon tetrachloride;[90] complete termination of carbon tetrachloride production is mandated two years prior to the date set by the

85. CAA § 604(e)(1), 42 U.S.C. § 7671c(e)(1). Section 604(e)(1) provides:

> Notwithstanding the phase-out and termination of production required under subsections (a) and (b), the Administrator, after notice and opportunity for public comment, may, consistent with the Montreal Protocol, authorize the production of limited quantities of a class I substance in excess of the amounts otherwise allowable under subsection (a) and (b), or both, solely for export to, and use in, developing countries that are Parties to the Montreal Protocol and are operating under article 5 of such Protocol. Any production authorized under this paragraph shall be solely for purposes of satisfying the basic needs of such countries.

Id.

86. Article 5 of the Montreal Protocol states in pertinent part:

> The Parties undertake to facilitate access to environmentally safe alternative substances and technology for Parties that are developing countries and assist them to make expeditious use of such alternatives.
>
> The Parties undertake to facilitate bilaterally or multilaterally the provision of subsidies, aid, credits, guarantees or insurance programmes to Parties that are developing countries for the use of alternative technology and for substitute products.

Montreal Protocol, *supra* note 48, at 1555-56.

87. CAA § 606(a)(1), 42 U.S.C. § 7671e(a)(1). The CAA leaves this decision to the Administrator of the Environmental Protection Agency (EPA) after public notice and comment. *Id.*

88. Council Regulation 594/91, *supra* note 58, art. 9, at 3. Article 9 of Council Regulation 594/91 states:

> By derogation from Articles 5, 6 (1) and (2), 7 and 8, the trade of controlled substances as well as products which contain and/or are produced with one or several of these substances with any non-Party may be permitted by the Commission, to the extent that the non-Party is determined by the meeting of the Parties to be in full compliance with Articles 2, 2a to 2e and 4 of the Protocol and have submitted data to that effect as specified in Article 7 of the Protocol. The Commission shall act in accordance with the procedure set out in Article 12.

Id.

89. *Id.* art. 12, at 7. Adoption of an exclusion would require a majority of the representative votes of the Member States serving on the Commission. *Id.*

90. *Id.* art. 10, at 4. For a discussion of the EC's phaseout of carbon tetrachloride, see *supra* note 72 and accompanying text. United States requires that by 1994, producers cut their 1986 levels of carbon tetrachloride production to 70% of

United States.[91] In addition, with regard to the five CFCs composing the first class or group of each provision, the United States' percentage reduction is substantially lower than that of the EC.[92] Moreover, the EC's total prohibition occurs two-and-one-half years prior to that of the United States.[93] While a ten to twenty-five percent variation or a two to three year lag in termination may seem minor, the current introduction of millions of pounds of chemicals into the atmosphere each year, mandates immediate action.[94]

Although the CAA falls short of Regulation 594/91 in certain aspects, it contains several provisions that are absent from the EC Regulation. For instance, CAA prohibits the sale of any nonessen-

baseline year (1986) levels. CAA § 604(a), 42 U.S.C. § 7671c(a). In 1995, production must be reduced to 15% of the 1986 production levels. *Id.*

91. Termination of United States' production of carbon tetrachloride occurs in the year 2000, two years after the EC phaseout is complete. CAA § 604(b), 42 U.S.C. § 7671c(b).

92. CAA § 604(a), 42 U.S.C. § 7671c(a). The United States measured the phaseout of the production of Class 1 CFCs against 1986 production levels. CAA § 601(2)(A), 42 U.S.C. § 7671(2)(A). The phaseout, as measured against the 1986 production year, is as follows: 85% of 1986 levels by 1991, 80% of 1986 levels by 1992, 75% of 1986 levels by 1993, 65% of 1986 levels by 1994, 50% of 1986 levels by 1995, 40% of 1986 levels by 1996 and 15% of 1986 levels by 1997. CAA § 604, 42 U.S.C. § 7671c. For a discussion of the EC's Group I CFC phaseout schedule, see *supra* note 69.

93. CAA § 604(b), 42 U.S.C. § 7671c(b). The CAA United States mandates termination of production of class 1 substances, effective January 1, 2000. *Id.* In comparison, production of Group I substances terminates in the EC as of June 30, 1997. Council Regulation 594/91, *supra* note 58, art. 10, at 3-4.

94. The United States' phaseout may be accelerated if scientific information demonstrates a need for greater action. CAA § 606(a)(1), 42 U.S.C. § 7671e(a)(1).

tial products[95] after January 1, 1994.[96] In addition, the CAA requires the promulgation of rules requiring that products containing or manufactured with class one or class two substances be labelled to identify their ozone depleting potential.[97] The EC regulations do not consider essentiality, nor do they discuss labeling. Lastly, the CAA provides for consideration of safe alternatives.[98] No similar provision exists in Regulation 594/91.

B. Acid Rain

1. International Nature of the Crisis

The term "acid rain" refers to air pollution created from sulfur, nitrogen, and hydrocarbon emissions.[99] Sulfur emissions are primarily the by-product of the burning of oil and coal in large power

95. The CAA defines "nonessential products" as follows:

> The regulations under this section shall identify nonessential products that release class 1 substances into the environment (including any release occurring during manufacture, use, storage, or disposal) and prohibit any person from selling or distributing any such product, or offering any such product for sale or distribution, in interstate commerce. At a minimum, such prohibition shall apply to—
>
> (1) chlorofluorocarbon-propelled plastic party streamers and noise horns,
>
> (2) chlorofluorocarbon-containing cleaning fluids for non-commercial electronic and photographic equipment, and
>
> (3) other consumer products that are determined by the Administrator—
>
> (A) to release class 1 substances into the environment (including any release occurring during manufacture, use, storage, or disposal), and
>
> (B) to be nonessential. In determining whether a product is nonessential, the Administrator shall consider the purpose or intended use of the product, the technological availability of substitutes for such product and for such class 1 substance, safety, health, and other relevant factors.

CAA § 610(b), 42 U.S.C. § 7671i(b).

96. CAA § 610(c)-(d), 42 U.S.C. § 7671i(c)-(d).

97. CAA § 611(b), 42 U.S.C. § 7671j(b).

98. CAA § 612(a), 42 U.S.C. § 7671k(a). The policy provides: "To the maximum extent practicable, class I and class II substances shall be replaced by chemicals, product substitutes, or alternative manufacturing processes that reduce overall risk to human health and the environment." *Id.* The Administrator is also given all necessary authority to promote the conversion from ozone-depleting substances to safe alternatives. CAA § 612(b), 42 U.S.C. § 7671k(b).

99. United Nations, Environment Programme, Environmental Data Report, 3d Edition, 37 (1991). [hereinafter UN Report]. However, the definition is more inclusive because

> [A]ll forms of precipitation—not just rain—can be acidic. Indeed, the definition includes acidifying compounds that are deposited in dry form. As a result, *acid deposition* is the scientifically accurate and all encompassing term for acid rain. For simplicity as well as by conventional usage,

plants;[100] motor vehicles and fossil fueled power plants are the primary sources of nitrogen releases.[101] Once released into the atmosphere, a chemical reaction occurs between these compounds and the oxygen and water found in the atmosphere.[102] The reaction results in the creation of sulfuric and nitric acid.[103] These acids then fall back to the earth in the form of precipitation where they can cause damage to humans, wildlife and vegetation.[104]

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however, the term *acid rain* is commonly used to include both precipitation and dry deposition.

James L. Regens & Robert W. Rycroft, THE ACID RAIN CONTROVERSY, (Univ of Pittsburgh Press, 1988), 35.

100. UN Report, *supra* note 99, at 37.

101. *Id.* Research shows that "global emissions of NO_x are divided equally between anthropogenic (fossil fuel combustion and biomass burning) and natural sources (microbial sources and lightning). *Id.* Additionally, "'[m]anmade nitrogen oxides originate mainly from small, mobile sources such as motor vehicles (approximately forty percent) and by fossil fueled power plants (approximately thirty percent).'" David Rubin, Comment, *Acid Rain in the European Community: A Hard Rain's A-Gonna Fall*, 16 BROOK. J. INT'L. L. 621, 622 (1990) (quoting World Commission on Environment and Development, Our Common Future (Oxford and New York: Oxford University Press 1987) at 1, *reprinted in* J. BRUNNEE, ACID RAIN AND OZONE LAYER DEPLETION 1 (1988)).

102. Regens & Rycoft, *supra* note 99, at 42. "When a fossil fuel is burned, the sulfur and nitrogen in the fuel combine with oxygen in the atmosphere to form sulfur and nitrogen oxides. In contact with air, SO_2 and NO_x are spontaneously oxidized to form sulfate and nitrate . . . ." *Id.*

103. *Id.*

104. *Id.* The impact of acid rain is one of the most hotly contested areas of science today. Some researchers argue conclusive evidence exists that acid rain has an extreme impact on our lakes and rivers because of the water's inability to neutralize the acidic compounds. *Id.* at 48. Once these bodies of water reach a certain level of acidity, their aquatic life will die. *Id.* In addition, some research suggests acid rain is detrimental to the forests, aquifers, agricultural production and humans. *Id.* at 48-51.

In contrast, the most comprehensive acid rain study ever funded by the United States provides an abundance of evidence minimizing the effect of acid rain. Howard Kurtz, *Is Acid Rain a Tempest in News Media Teapot?; Study Questioning Harm Gets Little Attention*, WASH. POST, Jan. 14, 1991, at A3. The study was a $500 million, "10-year study by the National Acid Precipitation Assessment Program (NAPAP), an inter-agency body created by Congress in 1980 to settle once and for all the debate over the effects of acid rain caused by industrial pollutants." *Id.* The study concluded "that acid rain, while still a problem, has caused far less damage to the nation's forest and lakes than previously estimated." *Id.* Thus, the NAPAP report suggests that

> [w]hile acid rain is helping to damage aquatic life in about 10 percent of eastern lakes and streams, the study said, the number of lakes damaged has remained unchanged since 1980. The report also said that acid rain is contributing to the erosion of buildings and statues and is reducing visibility in the eastern United States.

Id. Edward Krug, a chief watershed scientist at the University of Illinois, who was one of the scientists participating in the study, said that "despite 'outrageous claims' by some scientists, the effects of acid rain 'are less than 1 percent of what people were claiming 10 years ago.'" *Id.* Even EPA, however, criticized Krug,

Acid rain is a global problem; it may go up in one place, but it often returns to the earth in someone else's "backyard." In Europe, most of the sulfur deposits found in the Member States originate outside their borders.[105] Thus, the only way a country can substantially improve its air quality is for its neighbors to modify their behavior. Because a state's emissions often do not cause injury within its own borders, it has no incentive to self-regulate. Furthermore, the EC, as a whole, has the additional problem that much of its pollution is originating from non-Member States.[106]

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claiming he has "limited scientific credibility" and "is well outside the mainstream of scientific consensus on the acid rain issue." *Id.*

A more recent study evaluating data from 1,180 lakes and 4,670 streams concluded that "acid rain was the dominant source of acidity in surface waters." Robert Cooke, *Study Finds New Acid Rain Evidence*, NEWSDAY, May 24, 1991, at 19. Lawrence A. Baker, a University of Minnesota Water Resources Center researcher who has worked with EPA, said "[t]he studies, in total, provide unequivocal evidence of depositional effects, meaning acid rain." *Id.* The research also states:

> Sources of acidity other than acid rain are drainage from mined areas, as in Pennsylvania and West Virginia, and deposits of organic matter in the water. The survey found one-fourth of the lakes and streams were acidic because of organic matter, and 26 percent of acidic streams were impacted by mine drainage.
>
> The question of acid sources is important for policy covering smoke emissions from power plants and other sources of sulfur-rich smoke. The new Clean Air Act, for example, mandates a roughly 50-percent reduction in sulfur dioxide emissions by 1995, and further reductions by the year 2000. Arguments have continued over whether pollutants injected into the atmosphere in the Midwest are coming down as acid rain in New York, New England and Canada which are downwind of the sources. Foresters and state officials say sugar maples, spruce and other trees are being damaged. Wildlife experts warn of fish and other organisms disappearing from those waters.
>
> Some recent research has suggested that some of the lakes and streams that seem damaged are naturally acidic, and that the damage caused by acid rain is being exaggerated. The new statistically designed study now suggests otherwise, Baker said.

Id.

105. UN Report, *supra* note 99, at 37-40.

> [M]uch of the air pollution responsible for acidification originates in one state and is transported into the atmosphere hundreds or even thousands of miles away from its original source before it eventually returns to earth .... Countries that have very low emissions may be polluted almost exclusively from foreign sources. Additionally, states with higher emissions, that attempt to take efficient national abatement actions, may have all their efforts thwarted by countries unwilling to take responsible national action. The fact that the national policies of sovereign states result in consequential damage to neighboring states makes acid rain an international problem, requiring international regulation.

Rubin, *supra* note 101, at 624-25.

106. *See* Dovland, *Monitoring European Transboundary Air Pollution*, 29 ENV'T 10, 15 (1987); Slama, *An International Comparison of Sulfur Dioxide Emissions*, 10 J. COMP. ECON. 277, 280-82 (1986).

2. EC Initiatives

The EC's initial action was the adoption of Council Directive 80/779.[107] Directive 80/779 fixed limit values and guide values for sulfur dioxide and other suspended particulates that cause acid rain.[108] The Directive also required Member States to perform testing in critical areas to ensure compliance with limit values.[109] Member States were to report these results to the Commission.[110] If test results exceed established value levels, the Member State must also submit a strategy for compliance with the results.[111] Subsequent reports from the Commission suggest that most Member States have failed to modify existing legislation or to introduce initial regulations.[112]

Due to the lack of compliance, the EC enacted Council Directive 89/427.[113] Directive 89/427 modified the testing procedures

107. Council Directive on Air Quality Limit Values and Guide Values for Sulfur Dioxide and Suspended Particulates, 1980 O.J. (L 229) 30.

108. *Id.* art. 2, at 31. Article 2 of Directive 80/779 defines "limit values" as follows:

> —The concentrations of sulphur dioxide and suspended particulates considered simultaneously in accordance with Table A in Annex I, and
> —The concentrations of suspended particulates considered separately in accordance with Table B in Annex I, which, in order to protect human health in particular, must not be exceeded through out the territory of the Member States during specific periods and under the conditions laid down in the following Articles.

Id. The Directive defines "guide values" as "the concentrations of sulphur dioxide and suspended particulates over specified periods which are given in Annex II and are intended to serve as: —long-term precautions for health and the environment, —reference points for the establishment of specific schemes within zones determined by the Member States." *Id.* The tables simply provide the median of daily mean values, the value of which the Member States must insure is not exceeded for more than three consecutive days. *Id.* at 34-35.

109. *Id.* art. 3, at 31. Article 3 requires the "Member States . . . take appropriate measures to ensure as from 1 April 1983 the concentrations of sulfur dioxide and suspended particulates in the atmosphere are not greater than the limit values . . . ." *Id.*

110. *Id.* art. 7, at 32. Article 7 of the Directive requires that

> [f]ollowing the entry into force of this Directive, Member States shall inform the Commission, not later than six months after the end (31 March) of the annual reference period, of instances in which the limit values laid down in Annex I have been exceeded and of the concentrations recorded. . . . They shall also notify the Commission, not later than one year after the end of the annual reference period, of the reasons for such instances and of the measures they have taken to avoid their recurrence.

Id.

111. *Id.* art. 3, at 31.

112. Anthony D. Rizzotti, *EC Regulation of Sulphur Dioxide Levels: Directive 89/427*, 14 B.C. INT'L & COMP. L. REV. 369, 372 (1991).

113. Council Directive Amending Directive 80/779/EEC on Air Quality Limits and Guide Values for Sulphur Dioxide and Suspended Particulates, 1989 O.J. (L 201) 53.

and particulate limits thereby creating a uniform reporting standard intended to minimize many of the reporting problems identified under Directive 80/779.[114] Additional problems with the transmission of information and the publication of reports resulted in the adoption of Council Directive 91/692.[115] This Directive increased the frequency of Member States' reports and reduced the time allotted to the Commission to complete its report summary.[116]

3. Comparison with United States' Regulation

The United States is presently attempting to introduce the free enterprise system into the war against pollution. This process involves a number of actions by EPA under the 1990 Amendments to the CAA. First, EPA sets sulfur dioxide emission levels for all power plants based on achieving a nation-wide cap on SO_2 production by the year 2000.[117]

Second, the CAA imposes an allowance system instead of establishing a limit on production.[118] Under this system, EPA issues an allowance or credit to each plant for every ton of SO_2 emissions permitted to be released by that plant.[119] EPA bases these allowances on the utilities energy consumption rate from 1985-1987.[120] Should a plant not need all of its credits for a given year, that plant may sell its unused credits to a plant contemplating exceeding its allowed sulfur dioxide emissions.[121] Conversely, a plant expecting to exceed its allotted credits must purchase additional allowances on the market or risk incurring a penalty.[122] However, EPA places a limit on the total number of credits available creating a national cap on sulfur dioxide production.[123] EPA Administrator William Reilly estimated a "$1 billion savings compared to traditional prescriptive regulatory methods."[124] Proposed EPA regulations would create reductions in the levels of NO_x productions

114. *Id.* art. 1, at 54.

115. Council Directive Standardizing and Rationalizing Reports on the Implementation of Certain Directives Relating to the Environment, 1991 O.J. (L 377) 48.

116. *Id.* art. 2-7, at 48-50.

117. CAA § 404, 42 U.S.C. § 7651c.

118. CAA § 403, 42 U.S.C. § 7651b.

119. CAA § 403(a), 42 U.S.C. § 7651b(a).

120. *Id.*

121. CAA § 403(b), 42 U.S.C. § 7651b(b).

122. *Id.*

123. CAA § 403(a), 42 U.S.C. § 7651b(a).

124. Mark T. Hoske, *EPA Rules on Acid Rain, NO_x*, ELECTRIC LIGHT & POWER, Dec., 1992, at 3.

"largely from low-NO_x burner requirements for coal-fired utility boilers."[125]

Comparison between the EC and United States approaches to acid rain is difficult due to the uniqueness of the CAA's pollution credit system. The CAA relies on the premise that successful pollution control requires free market input.[126] In contrast, the EC follows the traditional prescriptive method subject to the traditional problems regarding EC enforcement. The groundwork has been laid for researchers and commentators to both study and critique the effectiveness of the two approaches.

IV. WATER QUALITY

A. Introduction

The waterways of Europe have been the workhorses for centuries of human advancement and industrialization. The waters of the rivers Thames, Rhine, and Danube have long been used as Europe's sewers, as Europe's power source, and as a route of travel.[127] However, the inland waterways as well as the Atlantic Ocean and the North and Mediterranean Seas, were used largely without regulation until this century.[128] Recognizing the need for comprehen-

125. *Id*

126. Norman W. Fichthorn, *Command-and-Control vs. The Market: The Potential Effects of Other Clean Air Act Requirements on Acid Rain Compliance*, 21 ENVT'L L. 2069, 2071-72 (1991).

127. This constant use has taken a toll. As early as the 1850's, literature began to reflect the havoc man was reeking on these waterways. Charles Dickens noted the state of the 19th Century Thames River on the first page of his novel *Bleak House*: "[F]og down the river, where it roles defiled among the tiers of shipping, and the waterside pollution of the great (and dirty) city." CHARLES DICKENS, BLEAK HOUSE 1 (Gordon N. Ray ed., Houghton Mifflin Co., 1956) (1853). The Thames river was so fetid by 1850 that all the fish had died and cholera plagued London. William K. Stevens, *Humanity Confronts Its Handiwork*, N.Y. TIMES, May 5, 1992, at C1. Since World War II, however, the river has been restored to health. *Id.* The Rhine River has suffered a similar fate. The increased use of fertilizers which drain more and more nitrates into the river has caused oxygen depletion in the River. *Id.*

128. *See* Robert J. McManus, *Ocean Dumping: Standards in Action*, ENVIRONMENTAL PROTECTION 119-20 (Harold K. Jacobson & David A. Kay eds., 1983). Even today, only 72% of all European sewage is treated before being released into open waters. Stevens, *supra* note 127, at C1. In some countries bordering the Mediterranean Sea, only 30% of sewage is treated prior to discharge. *Id.* A 1990 World Bank study showed that 650,000 tons of gasoline and 550 tons of pesticides were still falling untreated into the Mediterranean Sea each year. William Drozdiak, *North Africa's Wastes Defile Mediterranean*, WASH. POST, May 29, 1992, at A26.

sive yet flexible regulation of these common waterways, the EC began enacting environmental water regulations in the 1970s.[129]

While the EC has not enacted any comprehensive legislation to deal with the problems of water pollution, it has enacted several directives setting forth EC policy on water pollution.[130] It is incumbent on each Member State individually to enact laws that comply with these directives.[131] This section will review several current environmental policies of the EC as articulated in EC directives, and compare them to their United States' counterparts, focusing on the Federal Water Pollution Control Act, commonly known as the Clean Water Act ("CWA").[132]

B. General Water Regulation

1. EC Initiatives

On March 3, 1975, the Council of the European Communities passed Council Resolution on Energy and the Environment[133] and thus began the EC's earnest investigation into the state of the environment in its Member States.[134] In the Resolutions, the EC acknowledged the need for centralized data collection on the environmental impact of energy generation throughout the EC.[135] In order to fill that need, the Resolution requested that Members States submit data on the effects of certain substances. Specifically, the Resolution required Member States to submit proposals on regulation in three areas: thermal discharges, sulphur dioxide and nitrogen oxides.[136] This information gathered from Member States

129. Feeley & Gilhuly, *supra* note 1, at 677. The Community's water regulations have evolved since 1973. *See infra* note 133.

130. Although in some areas, EC and United States legislation parallel each other, the EC has not enacted anything analogous to the United States Clean Water Act. *Id.*

131. *See supra* notes 23-30 and accompanying text. Each Council Resolution or Directive addresses a specific water quality issue, such as ocean dumping or agricultural run-off.

132. Clean Water Act (CWA) §§ 101-607, 33 U.S.C. §§ 1251-1387 (1988). *See infra* notes 161-85 and accompanying text for an overview of the Clean Water Act.

133. Council Resolution of 3 March 1975 On Energy and the Environment, 1975 O.J. (C 168) 2.

134. *Id.* at 2-3. According to the *Directory of Community Legislation in Force and Other Acts of the Community Institutions,* June 1, 1992 (19th Edition), this resolution was one of the first pieces of environmental legislation enacted by the Council.

135. Council Resolution of 3 March 1975 On Energy and the Environment, 1975 O.J. (C 168) 2.

136. Council Resolution of 3 March 1975 On the Convention for the Prevention of Marine Pollution from Land-Based sources, 1975 O.J. (C 168) 1, at 2-3. Regarding thermal discharges, the resolution required that each member state commit to: (1) the collation of existing data and further study on the environmen-

was to provide a basis from which the EC could begin to study the effect of certain pollutants on the environment.[137]

In a subsequent resolution, Council Resolution of 24 June 1975, the Council recognized that the EC still did not have the necessary scientific data on which to base pollution level limits for certain substances.[138] Therefore, this Resolution added a "second-category" of pollutants to the list of substances to be studied under the EC initiative.[139] By identifying "second category" pollutants, the Council began the research process that would ultimately result in effluent and water quality level standards for these pollutants.[140]

In an effort to consolidate its legislation regulating water pollution, in May 1976, the Council enacted Council Directive 76/464 on Pollution Caused by Certain Dangerous Substances Discharged

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tal effects of these substances; (2) the exchange of information at the Community level on the site-planning of all new power plants; (3) the consideration of adding cooling towers to new power plants and improving the design of dry cooling towers to diminish their adverse environmental impact; and (4) the utilization of waste heat. *Id.* at 3.

Regarding sulphur dioxide, the resolution requested information concerning each Member States' progress on: (1) the reduction of the sulphur content of gas oils; (2) the regulation of the sulphur content in gas oils and the use of heavy fuel oils; (3) the supply level of low-pollution fuels, such as crude oil with low sulphur content, to users of heavily polluting fuels in particularly polluted areas; (4) the promotion of desulphurization development and other processes for reducing the discharge of sulphur dioxide into the atmosphere; and (5) the promotion of efficient use of fuels. *Id.*

Regarding nitrogen oxides, the resolution requested that the following activities be instituted: (1) the intensification of research relating to the efforts of nitrogen oxides on man and the environment; (2) the development of preventative measures; and (3) the implementation of preventative measures to reduce sources of pollution by oxides of nitrogen. *Id.*

137. *Id.*

138. Council Resolution of 24 June 1975 Concerning a Revised List of Second-Category Pollutants to be Studied as Part of the Programme of Action of the European Communities on the Environment [hereinafter Council Resolution of 24 June 1975], 1975 O.J. (C 168) 4.

139. *Id.* The original listing of First and Second category pollutants was contained in Council Declaration of 22 November 1973 on the Programme of Action of the European Communities on the Environment, part II, title I, chapter 1, 1973 O.J (C 112) 1, 13. First category water pollutants included organic micropollutants and their metabolites (mercury, cadmium, chromium, copper, nickel, arsenic, beryllium, cyanide), and hydrocarbons. *Id.* Second category water pollutants included dyes, vanadium, boron, antimony, cobalt, barium, thallium, phosphates, other pesticides, organic solvents, iron and free chlorine, substances having and unpleasant odor or taste, and bleaching agents. *Id.* The list of Second category pollutants was replaced by a new list contained in Council Resolution of 24 June 1975. For a listing of Second-Category pollutants, *see infra* note 140.

140. Council Resolution of 24 June 1975, *supra* note 138, at 4. The relevant water pollutants were: chlorine and its compounds, nitrates and nitrites, pesticides, organic solvents, phthalates, asbestos, ammonia, organic silicon compounds, and cationic, anionic and non ionic surfactants. *Id.*

into the Aquatic Environment of the Community.[141] In this Directive, the Council acknowledged the necessity of coordinating all EC efforts to safeguard the aquatic environment.[142] The Directive highlighted the urgent need for simultaneous action by all Member States to combat aquatic pollution; without simultaneous action, regulatory disparities between the Member States could have a negative economic effect on the Common Market.[143]

Directive 76/464 applies to all inland surface waters, territorial waters, internal coastal waters, and groundwaters.[144] It states that the Council will, acting on a proposal from the Commission, establish maximum effluent standards and quality objectives for each List I[145] and List II substance.[146] To this, the Directive requires that Member States enact legislation requiring dischargers to receive prior authorization from a designated state official for discharges

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141. Council Directive 76/464, 1976 O.J. (L 129) 23.

142. *Id.*

143. *Id.* "[A]ny disparity between the provisions on the discharge of certain dangerous substances into the aquatic environment already applicable or in preparation in the various Member States may create unequal conditions of competition and thus directly affect the functioning of the common market." *Id.*

144. *Id.* art. 1, at 24. "[I]nland surface waters" are defined for the purposes of this Council Directive as "all static or flowing fresh surface waters in the territory of one or more Member States." *Id.* "[I]nternal coastal waters" are defined for the purposes of this Council Directive as "waters on the landward side of the base line from which the breadth of territorial waters is measured, extending, in the case of watercourses, up to the fresh-water limit." *Id.*

145. Council Directive 76/464, art. 6, 1976 O.J. (L 129) 23, 25. List I substances were selected primarily on the basis of their toxicity, persistence and bioaccumulation. *Id.* The list includes:

1. organohalogen compounds and substances which may form such compounds in the aquatic environment,
2. organophosphorus compounds,
3. organotin compounds,
4. substances in respect of which it has been proved that they possess carcinogenic properties in or via the aquatic environment with proven aquatic carcinogenic properties in or via the aquatic environment, [footnote omitted],
5. mercury and its compounds,
6. cadmium and its compounds,
7. persistent mineral oils and hydrocarbons of petroleum origin, and . . .
8. persistent synthetic substances which may float, remain in suspension or sink, and which may interfere with any use of the waters.

Id. Annex, at 28. Council Directive 76/464 also stated that if List II substances were later determined to be carcinogens, those substances would then become List I substances. *Id.* Annex, at 28, n.1.

146. *Id.* art. 7, at 26. List II substances are those which have a deleterious effect on the aquatic environment, but can be confined to a given area depending on the characteristics and location of the water into which they are discharged. *Id.* Annex, at 28. List II contains:

1. The following metalloids and metals and their compounds:

which could contain any List I or List II substances.[147] The official authorization, or permit, would be valid for a specific period of time and outline the applicable effluent standard.[148] A Member State must apply the Council-set effluent standards unless it can prove that the water quality objectives set by the Council are being met in the area of water that could be affected by the discharge.[149] The Directive also requests that each Member State submit to the Council details of their discharge authorization programs, the inventory of discharges, and the results of their monitoring system.[150]

Council Directive 86/280, enacted 10 years after Directive 76/464, contains the Council's first major declaration of effluent stan-

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1.	Zinc	11.	Tin
2.	Copper	12.	Barium
3.	Nickel	13.	Beryllium
4.	Chromium	14.	Boron
5.	Lead	15.	Uranium
6.	Selenium	16.	Vanadium
7.	Arsenic	17.	Cobalt
8.	Antimony	18.	Thalium
9.	Molybdenum	19.	Tellurium
10.	Titanium	20.	Silver

2. Biocides and their derivatives not contained in List I.
3. Substances which have a deleterious effect on the taste and/or smell of the products for human consumption derived from the aquatic environment, and compounds liable to give rise to such substances in water.
4. Toxic or persistent organic compounds of silicon, and substances which may give rise to such compounds in water, excluding those which are biologically harmless or are rapidly converted into harmless substances.
5. Inorganic compounds of phosphorus and elemental phosphorus.
6. Non persistent mineral oils and hydrocarbons of petroleum origin.
7. Cyanides, fluorides.
8. Substances which have an adverse effect on the oxygen balance, particularly: ammonia, nitrates.

Id. Annex, at 28-29. List II substances also include List I substances for which limit standards have not yet been determined pursuant to Article 6 of Council Directive 76/464. *Id.* at 28.

147. Council Directive 76/464, art. 3, art. 7, 1976 O.J. (L 129) 23, 25, 26.

148. *Id.* Council Directive 76/464 required Member States to have a zero emission standard for List I substances to be discharged into groundwater, except for those discharges injected into "deep, saline and unusable strata and domestic effluent." *Id.*, art. 4, at 25. However, the provisions of Council Directive 76/464 relating to groundwater were superseded in December of 1979 by Council Directive 80/68, which specifically regulates discharges into or effecting groundwater. For a discussion of Council Directive 80/68, see *infra* notes 206-15 and accompanying text.

149. Council Directive 76/464, art. 6, 1976 O.J. (L 129) 23, 26. The Member State has to prove to the Commission that the water quality standards were in fact being met, in accordance with the monitoring procedure set up by the Council. *Id.*

150. *Id.* art. 13, at 27.

dards.[151] This Directive sets out effluent standards and water quality objectives for three substances: carbon tetrachloride, dichlorodiphenyl-trichloro-ethane ("DDT"), and pentachlorophenol.[152] In 1988, Directive 86/280 was amended to include aldrin, dieldrin, endrin, isodrin, hexachlorobenzene, hexachlorobutadiene, and chloroform as List I substances.[153] In 1990, Directive 86/280 was further amended to include 1,2,-dichloroethane ("EDC"), trichloroethylene ("TRI"), perchlororethylene ("PER"), and

151. Council Directive 86/280, 1986 O.J. (L 181) 16. Directive 86/280 concerns limit values and quality objectives for discharges of certain dangerous List I substances declared in Directive 76/464. *Id.*

152. Council Directive 86/280, Annex II, 1986 O.J. (L 181) 16, 23. Discharges by facilities who produce carbon tetrachloride must not exceed an average daily effluent concentration of 3.0 mg/l of the substance. *Id.* at 24. The average monthly effluent concentration must not exceed 1.5 mg/l of the substance. *Id.* at 24. For the water quality objective for carbon tetrachloride, see *id.* at 24.

Discharges by facilities that produce DDT must not exceed an average daily effluent concentration of 0.4 mg/l for every 8 g/ton of substances produced, handled or used. Council Directive 86/280, Annex II, 1986 O.J. (L 181) 16, 25. The average monthly effluent concentration must not exceed 0.2 mg/l for every 4 g/tons of substances produced, handled or used. *Id.* The water quality objective is a concentration of 10 g/l of DDT or less for inland surface waters, estuary waters and internal coastal waters, and 25g/l for territorial sea waters. *Id.* at 26.

Discharges by facilities that produce pentachlorophenol must not exceed an average daily effluent concentration of 2.0 mg/l for every 50 g/tons of production capacity. Council Directive 86/280, Annex II, 1986 O.J. (L 181) 16, 26. The average monthly effluent concentration must not exceed 1.0 mg/l for every 25 g/tons of production capacity. *Id.* The water quality objective is a concentration of 2 g/l or less. *Id.* at 27.

153. Council Directive 88/347, art 1, 1988 O.J. (L 158) 35, 35-41. Discharges by facilities who produce aldrin, dieldrin, endrin, and/or isodrin must not exceed an average daily effluent concentration of 10.0 g/l. *Id.* at 36. The average monthly effluent concentration must not exceed 2.0 g/l. *Id.* The water quality objective is a concentration for aldrin and dieldrin is 10 g/l. *Id.* The water quality objective for endrin and isodrin is 5 g/l. *Id.*

Facilities producing hexachlorobenzene ("HCB") must not exceed a daily average effluent concentration of 2 mg/l of HCB. *Id.* at 37. The average monthly effluent concentration must not exceed 1 mg/l of HCB. *Id.* The water quality objective is a concentration of 0.03 g/l of HCB or less. *Id.* at 38.

Facilities producing perchloroethylene and carbon tetrachloride by perchlorination must not exceed a daily average effluent concentration of 3 mg/l of HCB. *Id.* at 37. The average monthly effluent concentration must not exceed 1.5 mg/l of HCB. *Id.* The water quality objective is a concentration of 0.03 g/l of HCB or less. *Id.* at 38

Facilities producing hexachlorobutadiene ("HCBD") must not exceed a daily average effluent concentration of 3 mg/l of HCBD. *Id.* at 39. The average monthly effluent concentration must not exceed 1.5 mg/l of HCBD. *Id.* The water quality objective is a concentration of 0.1 g/l. *Id.*

Facilities producing chloroform must not exceed an average monthly effluent concentration of 1.0 mg/l. *Id.* at 40. The water quality objective is a concentration of 12 g/l. *Id.*

For a listing of List I and List II substances, see *supra* notes 145 and 146 respectively.

trichlororbenzene ("TCB").[154] Member States are required to independently set standards for those remaining List I substances without Council-set effluent and water quality standards.[155] Each Member State must develop standards using the best technical means available.[156] The standards must also be at least as stringent as the "most nearly comparable limit value set out" for the three documented substances in Directive 86/280.[157] If a Member State

154. Council Directive 90/415, art. 1, 1990 O.J. (L 219) 49. The Council set a daily average effluent standard of 4 mg/l, and an average monthly effluent standard of 2 mg/l from January 1, 1993 for industrial plants producing 1,2-dichloroethane (EDC). *Id.* Annex, at 51. By January 1, 1995, the daily average effluent standard must not exceed 2.5 mg/l, and the monthly average effluent standard must not exceed 1.25 mg/l of EDC. *Id.* The water quality objective for inland surface, estuary, inland coastal and territorial waters is 10 µg/l of EDC. *Id.* at 53. For the effluent standards for other types of industrial plants utilizing EDC, *see* Council Directive 90/415, Annex, 1990 O.J. (L 219) 49, 51.

The Council set a daily average effluent standard of 4 mg/l, and an average monthly effluent standard of 2 mg/l from January 1, 1993 for industrial plants producing trichloroethylene (TRI). Council Directive 90/415, Annex, 1990 O.J. (L 219) 49, 51. By January 1, 1995, the daily average effluent standard must not exceed 1 mg/l, and the monthly average effluent standard must not exceed 0.5 mg/l of TRI. *Id.* For industrial plants using TRI for degreasing metals, the average daily effluent standard of TRI must not exceed 0.2 mg/l and the average monthly effluent standard must not exceed 0.1 mg/l of TRI. The water quality objective for inland surface, estuary, inland coastal and territorial waters is 10 µg/l of TRI. *Id.* at 54.

Regarding perchloroethylene (PER), the Council set a daily average effluent standard of 4 mg/l, and an average monthly effluent standard of 2 mg/l from January 1, 1993 for PER for industrial plants engaging in "TRI-PER processes". Council Directive 90/415, Annex, 1990 O.J. (L 219) 49, 55. By January 1, 1995, the daily average effluent standard must not exceed 1 mg/l, and the monthly average effluent standard must not exceed 0.5 mg/l of PER. *Id.* The water quality objective for inland surface, estuary, inland coastal and territorial waters for PER is 10 µg/l. *Id.* For effluent standards relating to other kinds of industrial plants using PER, see Council Directive 90/415, Annex, 1990 O.J. (L 219) 49, 55.

The Council set a daily average effluent standard of 5 mg/l, and an average monthly effluent standard of 2.5 mg/l from January 1, 1993 for trichlorobenzene (TCB) for industrial plants producing TCB via dehydrochlorination of HCH and/or processing TCB. Council Directive 90/415, Annex, 1990 O.J. (L 219) 49, 56. By January 1, 1995, the daily average effluent standard must not exceed 2 mg/l, and the monthly average effluent standard must not exceed 1.0 mg/l of TCB. *Id.* The water quality objective for inland surface, estuary, inland coastal and territorial waters for TCB is 0.4 µg/l. *Id.* at 57. For effluent standards relating to other kinds of industrial plants using TCB, see Council Directive 90/415, Annex, 1990 O.J. (L 219) 49, 56. In addition to these standards relating to TCB, the Directive requires that there be "no significant direct or indirect increase over time in pollution arising from discharges of TCB and affecting concentrations in sediments and/or molluscs and/or shellfish and/or fish." Council Directive 90/415, Annex, 1990 O.J. (L 219) 49, 56.

155. Council Directive 86/260, Annex I, 1986 O.J. (L 181) 16, 20.

156. *Id.*

157. *Id.* For the limit values for carbon tetrachloride, DDT, and pentachlorophenol, see *supra* note 152. For limit values for aldrin, dieldrin, endrin, isodrin, hexachlorobenzene, hexachlorobutadiene, and chloroform, see

wants to set an effluent standard that exceeds the Council-set standard, the Member State must prove to the Council that its effluent standard will not adversely affect the environment.[158]

In addition to regulating all discharges, Member States must also report their procedures and results of the monitoring system for all discharges to the Commission.[159] The Directive also sets out very general sampling guidelines that Member States should adopt.[160]

2. *United States' Efforts*

The Federal Water Pollution Control Act, commonly known as the Clean Water Act ("CWA"), is the primary legislation enacted by Congress to "restore and maintain the chemical, physical and biological integrity of [the] Nation's waters."[161] To accomplish this objective, the CWA makes it unlawful for any unauthorized person to discharge any pollutant into the nation's waterways.[162]

The CWA works to control water pollution by imposing water quality standards, technology-based effluent limitations, and a national permit program.[163] Section 303(a)(3) of the Act specifies that water quality standards for intrastate waters are to be determined by the states.[164] Any state standard, must be based on the

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supra note 153. For the limit values for dichloroethane, trichloroethylene, perchloroethylene, and trichlorobenzene, see *supra* note 154.

158. *Id.* at 21. Under Article 6(3) of Council Directive 76/464, Member States may petition the Council to have a discharge effluent standard in excess of the stated Council standard. The Member State must prove that the overall quality of the relevant body of water meets or exceeds the Council's water quality objective in order to have an effluent standard in excess of the Council-set standard. *Id.*

159. Council Directive 86/280, Annex I, 1986 O.J. (L 181) 16, 21. The report to the Commission must contain the points of discharge and means of dispersal, the area in which the quality objective is applied, the location of sampling points, the frequency and methods of sampling, and the results of such sampling. *Id.*

160. *Id.*

> Samples must be taken at a point sufficiently close to the discharge point to be representative of the quality of the aquatic environment in the area affected by the discharges, and the frequency of sampling must be sufficient to show any changes in the aquatic environment, having regard in particular to natural variations in hydrological conditions.

Id. The Directive also states that effluent flow measurements must have an accuracy margin of 20%. *Id.* at 22.

161. Federal Water Pollution Control Act (CWA) §§ 101-607, 33 U.S.C. §§ 1251-1387 (1988 & Supp. IV 1992).

162. *Id.* Discharges are allowed only if a permit is granted in compliance with CWA §§ 301, 302, 318, 402, 404, 33 U.S.C. §§ 1311, 1312, 1328, 1342 and 1344 of the Act. *See id.*

163. THEODORE L. GARRETT, *Water Quality*, THE ENVIRONMENTAL LAW MANUAL 159 (Theodore L. Garrett ed., 1992).

164. CWA § 303(a)(3), 33 U.S.C. § 1313(3)(a).

results of biological monitoring and an assessment regarding the maximum concentration of pollutants that a specific water body type can tolerate and still maintain the various designated uses of the water body.[165] EPA must initially approve the state water quality standards and the standards must be reviewed by EPA every three years.[166]

The technology-based effluent limitations mandated under the CWA are determined by EPA on an industry-wide basis.[167] Unlike the various EC statutes, the CWA distinguishes between two types of sources: point and nonpoint.[168] Effluent limitations apply only to point source discharges. In determining the effluent limitations, EPA engages in a two step process. First, it studies the waste discharges of each industry category to identify the frequency and concentration of pollutants present.[169] EPA then reviews the technology available to control the discharges and the cost of implementing such controls.[170] Based on this data, EPA "establishes

165. *Id.* Water quality standards refer to the concentration of pollutants in the receiving water. JAMES A. LEE, THE ENVIRONMENT, PUBLIC HEALTH, AND HUMAN ECOLOGY, CONSIDERATIONS FOR ECONOMIC DEVELOPMENT 39 (1985). These standards establish a minimum quality level that must be maintained, regardless of the quality or quantity of regulated discharges. *Id.*

The CWA requires states to specify the "water uses" to be protected by the water quality standards. 40 C.F.R. § 131.10 (1992). In classifying waters, the state must take into consideration the "use and value of [the] water for public water supplies, protection and propagation of fish, shellfish and wildlife, recreation . . . in and on the water, agricultural, industrial, and other purposes including navigation." *Id.* "States may adopt seasonal uses as an alternative to reclassifying a water body . . . to uses requiring less stringent water quality criteria." *Id.*

The specific standards adopted by the state must be based on "sound scientific rationale and must contain sufficient parameters . . . to protect the designated use." 40 C.F.R. § 131.11 (1992). For waters with multiple designated uses, the criteria shall be used to support the most sensitive use. *Id.*

166. CWA, § 303(c), 33 U.S.C. § 1313(c); *see* GARRETT, *supra* note 163, at 159.

167. "[These t]echnology-based effluent limitations are established by the EPA and apply to all direct and indirect discharges in an industrial category unless an individual company can show that it is entitled to a variance." *Id.* (citing CWA §§ 301, 314, 33 U.S.C. §§ 1311, 1314). There are currently 34 industry categories identified by EPA. 40 C.F.R. Pt. 122, app. A (1992).

168. JACKSON B. BATTLE, ENVIRONMENTAL LAW, Vol. 2, at 10 (Anderson Publishing Co. 1976). "Point sources" are substances that are discharged from specific conveyances, such as pipes and canals. *Id.* "Nonpoint sources" are those discharges that cannot be traced to a conveyance, such as run-off from agricultural and industrial sites. *Id.* Commentators have noted that there has been considerable confusion over EPA's efforts to distinguish between point and nonpoint sources. *See, e.g.*, Kristy A. Niehaus Bulleit & Diane U. Montgomery, *Clean Water Act Permitting: The NPDES Program at Twenty in* THE ENVIRONMENTAL LAW MANUAL 161 (Theodore L. Garrett ed., 1992).

169. Bradley D. Jackson & Mark C. Van Putten, *The Dilution of the Clean Water Act*, 19 U. MICH. J. L. REFORM 863, 877 (1986).

170. *Id.* at 877-78.

effluent limitation guidelines specifying the pollutant discharge limits that must be included in the NPDES [National Pollutants Discharge Elimination System] permits issued to dischargers within each category."[171] Where it is technologically and economically feasible to require zero discharge level of a pollutant, EPA must mandate a zero discharge level.[172]

To manage all discharges, section 402 of the CWA created the NPDES, a complex permitting process that is the hallmark of the Act.[173] Under the CWA, no facility may lawfully discharge any substance from a point source without a permit.[174] NPDES permit effluent limitations are based on several factors, including EPA-set technology-based effluent limitation standards, the latest scientific data regarding the effect of the pollutants on the health and welfare of organic community,[175] and the toxicity of certain pollutants.[176] CWA also requires NPDES permits to incorporate state-set water quality standards, which may be more restrictive than the EPA-set technology-based effluent limitation guidelines.[177]

Where EPA has not established industry category effluent limitations applicable to the discharging facility, CWA allows the permit issuer to develop technology-based limits using its "best professional judgment" on a case-by-case basis.[178] These judgment-based limits must utilize the same factors EPA considers when it establishes na-

171. *Id.* at 878. In determining these effluent limitation guidelines, EPA only considers the feasibility of control and not the environmental effects of various levels of pollutant discharges. *Id.*

172. *Id.* (citing CWA § 301(b)(2)(A) & 304(b)(3), 33 U.S.C. § 1311(b)(2)(A) & 1314(b)(3)).

173. CWA § 402, 33 U.S.C. § 1342.

174. CWA § 301(a), 33 U.S.C. § 1311(a); BATTLE, *supra* note 168, at 10.

175. Jackson & Van Putten, *supra* note 169, at 879. The criteria should include the latest scientific knowledge of the impact of pollutants on water, including the effects on plankton, fish, shellfish, wildlife, plant life, the concentration and dispersal of pollutants through biological, physical, and chemical processes and the effects of pollutants on biological community, diversity, productivity, and stability and the toxicity of particular pollutants. CWA § 304, 33 U.S.C. § 1314.

176. *See* Jackson & Van Putten, *supra* note 169, at 879.

177. CWA § 301 (b)(1)(C), 33 U.S.C § 1311(b)(1)(C). *See* Jackson & Van Putten, *supra* note 169, at 879; *see also* BULLEIT & MONTGOMERY, *supra* note 168, at 168. The CWA requires states to designate the uses of state waters and to establish water quality criteria to protect those uses. *Id.* at 168. Section 303(d) of the CWA requires each state to establish the total maximum daily load ("TMDL") of specific pollutants that a body of water will tolerate and still maintain its water quality standards. *Id.* These TMDLs are then allocated among the different facilities discharging into a particular body of water. *Id.* at 168-69. NPDES permits incorporate the state water quality standards and the allocation of TMDLs. *Id.* at 169.

178. Bulleit & Montgomery, *supra* note 168, at 168.

tional guidelines.[179] This procedure is very similar to that implemented by the EC in Council Directives 76/464 and 86/280.[180] However, development of limits for toxic pollutants may not be left up to the permit user; section 307 of CWA requires that EPA develop effluent limits for toxic pollutants.[181] To date, EPA has identified eight such pollutants: Aldrin/dieldrin, Dichloro-diphenyl-trichloro-ethane, ("DDT"), Dichloro-diphenyl-dichloro-ethane ("DDD"), dichloro-diethyl-ether ("DDE"), endrin, toxaphene, benzidine, and polychlorinated biphenyls ("PCB").[182] The regulations promulgated by EPA regarding these pollutants outline water quality standards, and sampling methodology for each substance.[183] These regulations also set forth specific effluent limitation standards for endrin, toxaphene, and benzidine.[184] Discharges of al-

179. *Id.*

180. For a discussion of the applicable EC Directives, *see supra* notes 141-53 and accompanying text.

181. CWA § 307, 33 U.S.C. § 1317.

182. 40 C.F.R. § 129.4 (1992).

183. The water quality standards and sampling methodology for each substance are as follows:

Toxic Pollutant	Ambient Water Criterion	Sampling Method
Aldrin/dieldrin	0.003 µg/1	1 liter sample *but see also* 40 C.F.R. 136
DDT,DDD,DDE	0.001 µg/1	1 liter sample *but see also* 40 C.F.R. 136e
Endrin	0.004 µg/1	*see* 40 C.F.R. 136
Toxaphene	0.005 µg/1	*see* 40 C.F.R. 136
Benzidine	0.1 µg/1	*see* 40 C.F.R. 136
Polychlorinated Biphenyls	0.001 µg/1	1 liter sample *but see also* 40 C.F.R. 136

See 40 C.F.R. § 129.100-.105 (1992).

184. *See* 40 C.F.R. § 129.102-.104 (1992). The effluent standard for endrin by an endrin manufacturer from existing sources shall not exceed 1.5 g/1 average concentration per working day over any calendar month, "and shall not exceed a monthly average daily loading of 0.0006 kg/kkg of endrin produced." *Id.* § 129.102(b)(3)(i). Discharges shall also not exceed 7.5 g/1 in a sample representing any working day. *Id.*

The endrin effluent standard for an endrin manufacturer from new sources shall not exceed 0.1 g/1 average concentration per working day calculated over a calendar month. *Id.* § 129.102(b)(3)(i). The monthly average daily loading shall not exceed 0.00004 kg/kkg of endrin produced. Discharges samples for any given day shall not exceed 0.5 g/1. *Id.* Endrin formulators are prohibited from discharging compounds containing any endrin. *Id.*

The effluent standard for toxaphene manufacturers from existing sources shall not exceed 1.5 g/1 average per working day over any calendar month, "and shall not exceed a monthly average daily loading of 0.00003 kg/kkg of toxaphene produced." *Id.* § 129.103(b)(3)(i). Discharges shall not exceed 7.5 g/1 in a sample representing any working day. *Id.*

The toxaphene effluent standard for toxaphene manufacturers from new sources shall not exceed 0.1 g/1 average concentration per working day calculated

drin/dieldrin, DDT, DDD, DDE, or PCBs by any existing or future facilities that manufacture these substances are prohibited.[185]

3. Comparison

The overall structures of water regulations in the United States and the EC are similar. Both the United States and EC regulate water pollution through a system of authorizations, or permits, designed to control and monitor the discharge of designated pollutants into the aquatic environment.[186] Similarly, both governmental entities require their member states to comply with stated effluent standards or allow member states to establish water quality and effluent standards that meet the approval of the overseeing entity.[187]

The effluent and water quality standards set by the United States and the EC differ for various substances. For instance, the United States prohibits all discharges of DDT, PCBs, and aldrin/dieldrin; the EC still permits some level of these toxic substances under EC effluent and water quality standards.[188] Unlike the regulation of air pollution, the EC has no plan to phase out these pollutants in either effluent or water quality standards beyond 1991 for DDT and PCBs,[189] and 1994 for aldrin/dieldrin, endrin, isodrin, hexachlorobenzene, hexachlorobutadiene, and chloroform.[190] The existing regulations still allow small concentrations of these

over a calendar month. *Id.* § 129.103(b)(3)(ii). The average daily loading shall not exceed 0.000002 kg/kkg of toxaphene produced. *Id.* A toxaphene sample on any given working day shall not exceed 0.5 g/l. *Id.* Toxaphene formulators are prohibited from releasing any compound containing any toxaphene. *Id.*

The effluent standard for benzidine manufacturers from existing and new sources shall not exceed 10 g/l average per working day calculated over any calendar month, "and shall not exceed a monthly average daily loading of 0.130 kg/kkg of benzidine produced." *Id.* § 129.104(b)(3)(i)-(ii). Discharges shall not exceed 50 g/l in any sample representing any working day. *Id.*

The effluent standard for benzidine-based dye applicators shall not exceed a 10 g/l average per working day, "and shall not exceed 25 g/l in a sample . . . representing any working day" for existing and new sources. *Id.* § 129.104(b)(3)(i)-(ii).

185. *Id.*

186. *See* Council Directive 76/464, art. 3, art. 7, 1976 O.J. (L 129) 23, 25, 26, and CWA § 402, 33 U.S.C. 1342. For a discussion of Council Directive 76/464, see *supra* notes 141-50 and accompanying text. For a discussion of NPDES, see *supra* notes 171-77 and accompanying text.

187. *Compare* Council Directive 76/464, art. 6, 1976 O.J. (L 129) 23, 25 *with* CWA § 303, 33 U.S.C §§ 1313(b)(1)(A) & (C),(g)(2),(m)(1).

188. *See supra* notes 152-53 and accompanying text.

189. *See* Council Directive 86/280, Annex II, 1986 O.J. (L 181) 16, 24-26.

190. *See* Council Directive 88/347, art. 1, 1988 O.J. (L 158) 35, 36-40.

toxic pollutants to remain in both EC's effluent and water quality standards.[191]

A more subtle difference exists between the ultimate goals of the United States and EC regulations. The goal of the CWA is to eliminate "the discharge of pollutants into navigable waters . . . by 1985."[192] While the United States did not meet this objective by 1985, elimination remains the ultimate goal of regulations promulgated under the CWA.[193] In contrast, in 1973, the EC Council stated that one of the objectives underlying its environmental policies was to "prevent, reduce and *as far as possible* eliminate pollution and nuisances."[194] The loophole implicit in "as much as possible" has been incorporated into subsequent directives which, while providing for the reduction of certain pollutants in effluent and water quality standards, do not mandate the total elimination of these pollutants in EC waters.[195]

Finally, there is a difference in the scope of the statutes enacted by the United States and the EC. CWA provides a comprehensive statute regulating all the navigable waters of the United States. The EC, however, takes a topical approach to water quality, often focusing on the type of water body affected and outlining effluent or water quality standards.[196]

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191. *See* Council Directive 86/280, Annex II, 1986 O.J. (L 181) 16, 24-26 and Council Directive 88/347, art. 1, 1988 O.J. (L 158) 35, 36-40.

192. CWA § 101(a)(1), 33 U.S.C. § 1251(a)(1).

193. *Id.* In 1977, Congress implicitly rejected the recommendation of the National Commission on Water Quality to redefine the zero discharge goal by not including it in the amendments to the CWA. *See* Jackson & Van Putten, *supra* note 169, at 873 n.42. In fact, the amendments provided for stricter regulation of toxic pollutants. *Id.* (citing CWA § 307, 33 U.S.C. § 1317).

194. Declaration of the Council of the European Communities and of the Representatives of the Governments of the Member States Meeting in the Council of 22 November 1973 on the Programme of Action of the European Communities on the Environment, 1973 O.J. (C 112) 1, 5 (emphasis added).

195. *See* Council Directive 76/464, art. 2, 1974 O.J. (L 129) 23, 24 and Council Directive 80/68, 1980 O.J. (L 20) 43-44. While Council Directive 76/464 provides for the elimination of List I substances in all defined EC waters, Council Directive 80/68 provides that the discharge of List I and List II substances in "quantit[ies] and concentration[s] so small as to obviate any present or future danger of deterioration in the quality of the receiving groundwater" is allowed. Council Directive 80/68, art. 2, 1980 O.J. (L 20) 43, 44.

As mentioned previously, current water regulations provide that the existence of toxic substances like DDT and PCBs, which are prohibited in the United States, are acceptable in certain concentrations. *See supra* notes 152-54 and accompanying text.

196. *See, e.g.*, Council Directive 75/440, 1975 O.J. (L 194) 26 (concerning the quality required of surface water intended for abstraction of drinking water in Member States); Council Directive 79/869, 1979 O.J. (L 271) 44 (concerning methods of measurement and frequencies of sampling and analysis of surface water intended for abstraction of drinking water in the Member States); Council

C. Groundwater Pollution

1. Introduction

The earth's groundwaters are essential to sustain healthy life on this planet. More than fifty percent of the population in the United States relies directly on groundwater for its drinking water supplies.[197] Groundwater is also a primary water source for agriculture and industry.[198] Groundwater is located in aquifers, the fully saturated geological strata that lie beneath the water table.[199] Levels of groundwater increase as surface water filtrates through the earth's "recharge zone," a portion of the earth's surface composed of permeable soils.[200] Groundwater is visible at the surface through discharges in springs and into streams and lakes.[201] Contamination of groundwater occurs when pollutants are introduced into an aquifer's recharge zone, the surface streams that feed aquifers, or wells drilled into the aquifer.[202] Because the pollutants that reach the aquifer are not exposed to light or air, the biological pollutant breakdown that usually occurs in surface water does not happen.[203] Therefore, once an aquifer is polluted, it will likely remain polluted unless there is outside intervention.[204]

2. EC Initiatives

In December 1979, the EC Council enacted Directive 80/68 to protect the groundwater in the EC from contamination by List I and List II substances[205] through direct and indirect discharges.[206]

Directive 80/68, 1979 O.J. (L 20) 43 (concerning protection of groundwater against pollution caused by certain dangerous substances); Council Directive 86/479, 1986 O.J. (L 282) 23 (establishing advisory committee on protection of the environment in areas under serious threat (Mediterranean basin)).

197. Lawrence Ng, Note, *A Drastic Approach to Controlling Groundwater Pollution*, 98 YALE L.J. 773, 774 (1989). "[M]ore than ninety-five percent of rural households [are] dependent on groundwater as their source of drinking water." *Id.*

198. *Id.* at 773-74. "Groundwater provides . . . almost twenty-four percent of the nation's domestic, agricultural, and industrial water." *Id.* at 774.

199. *Id.* at 775.

200. *Id.*

201. *Id.*

202. Ng, *supra* note 197, at 776.

203. *Id.* at 778.

204. *Id.*

205. Council Directive 80/68, 1979 O.J. (L 20) 43. For a list of List I substances, see *supra* note 145. For a list of List II substances, see *supra* note 146.

206. *Id.* at 43-44. "Groundwater" is defined by the Directive as "all water which is below the surface of the ground in the saturation zone and in direct contact with the ground or subsoil." *Id.* art. 1, at 44. "Direct discharge" is defined as "the introduction into groundwater of substances in lists I or II without percolation through the ground or subsoil." *Id.* "Indirect discharge" is defined as "the intro-

Council Directive 80/68 requires Member States to take all steps necessary to prevent the discharge into groundwater of List I substances and to limit the discharge of List II substances into groundwater.[207] To accomplish this goal, Member States must prevent all direct discharges of List I substances,[208] investigate and regulate the disposal of such substances that might result in indirect groundwater discharge, and take all appropriate measures to control any activities that might result in the indirect discharge of List I substances into the groundwater.[209] Member States must also establish a method of investigation and regulation of activities that might result in the direct or indirect discharge of any List II substance.[210] Council Directive 80/68 further requires Member States to enact all laws, regulations, or administrative provisions necessary to comply with the Council Directive and to notify the Commission of all such enactments.[211]

The scope of the Directive 80/68, however, is limited; discharges from several sources are excluded from regulation. For instance, the Directive excludes discharges from dwellings not connected to a sewer system and located outside areas protected for the abstraction of drinking water for human consumption.[212] It also excludes discharges determined by the Member States to contain amounts of List I or II substances so small that they pose no threat to present or future quality of the receiving groundwater.[213] Additionally, discharges of matter containing radioactive substances are excluded from this Council Directive.[214]

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duction into groundwater of substances in lists I or II after percolation through the ground or subsoil." *Id.*

207. *Id.* art. 1, at 44.

208. For a discussion of the exemptions to this prohibition, see *infra* text accompanying notes 212-14.

209. Council Directive 80/68, art. 4, 1980 O.J. (L 20) 43, 44-45. Authorized direct or indirect discharges must be documented in accordance with Article 4 of the Council Directive. *Id.* at 45. The Council Directive requires each authorization of a direct discharge to indicate the place and method of discharge, the nature and concentration of the substance present in the effluent, the proximity of drinking, thermal and mineral water catchment areas, and measures for monitoring the groundwater quality. *Id.* art. 9, at 45. Authorizations for disposal of materials that might lead to the indirect discharge of substances must include the same information. *Id.*, art. 10, at 46.

210. *Id.* art. 5, at 45.

211. Council Directive 80/68, art. 21, 1980 O.J. (L 20) 43, 47.

212. *Id.* art. 2, at 44.

213. *Id.*

214. *Id.*

3. United States Regulation

Congress stated that the purpose of CWA was "to restore and maintain the . . . integrity of the Nation's waters."[215] Although the term "nation's waters" has been construed broadly,[216] "groundwater" is excluded from the definition.[217] Moreover, the NPDES applies only to point-source discharges[218] and therefore it does not apply to the primary source of groundwater pollution.[219] CWA provisions on pollution identification and reduction from nonpoint sources focus solely on "navigable waters."[220]

Federal United States legislation does indirectly provide for groundwater protection,[221] yet there is no coordinated federal approach to identifying and controlling groundwater pollution from all possible sources. Unlike the EC's comprehensive approach to groundwater protection, with established minimum compliance requirements, the United States has only piecemeal federal and state legislation.[222] EC legislation in this area could provide United States legislators with valuable guidance on addressing groundwater pollution.

D. Agricultural Pollution

1. Introduction

Farming has always been at the center of both European and American culture. Centuries of farming the same land, however, has created land virtually devoid of natural nutrients and a chemical industry designed to optimize crop production with the use of various chemical fertilizers and pesticides. Fertilizers rich in nutri-

215. CWA § 101, 33 U.S.C. § 1251.

216. *See* Bulleit & Montgomery, *supra* note 168, at 162.

217. Ng, *supra* note 197, at 779.

218. *See* CWA § 402, 33 U.S.C. § 1342.

219. *See* J.W. Looney, *The Changing Focus of Government Regulation of Agriculture in the United States*, 44 MERCER L. REV. 763, 799-802 (1993).

220. *See* CWA § 319, 33 U.S.C. § 1329.

221. *See infra* note 222.

222. Other federal statutes addressing groundwater include: the Safe Drinking Water Act, 42 U.S.C. §§ 300f-300j-11 (1988); the Resource Conservation and Recovery Act, 42 U.S.C. §§ 6901-6991i (1988); the Toxic Substances Control Act, 15 U.S.C. §§ 2601-2629 (1988); the Federal Insecticide, Fungicide and Rodenticide Act, 7 U.S.C. §§ 136-136y (1988); the Surface Mining Control and Reclamation Act, 30 U.S.C. §§ 1201-1328 (1988). In addition, all fifty states now have some legislation regarding groundwater quality. Ng, *supra* note 197, at 784. However, these state systems are not uniform, and the complexity of these standards vary widely. *Id.* For a complete discussion of groundwater legislation, see Robert L. Glicksman & George Cameron Coggins, *Groundwater Pollution I: The Problem and the Law*, 35 KAN. L. REV. 75 (1986).

ents such as nitrates can alter the patterns of plant growth, allowing increased yields from soil that has been eroded by over-farming.[223]

Nitrates, however, are highly soluble, and when nitrate-rich irrigation and rain run-off enters the marine environment, it stimulates the growth of algae ("algae blooms") and seaweed.[224] Algae overgrowth can cause eutrophication, which depletes oxygen in water.[225] In spite of this, the use of fertilizer has continued to increase, thus representing another threat to the viability of marine life.

2. *EC Initiatives*

In order to combat the growing nitrate pollution problem, the Council enacted Directive 91/676 Concerning the Protection of Waters Against Pollution Caused by Nitrates from Agricultural Sources to combat the problem in December 1991.[226] The Directive states that, although nitrate-based fertilizers are necessary for a successful agriculture industry, excessive use of such fertilizers poses a serious threat to human health, living resources and aquatic ecosystems.[227]

Directive 91/676 outlines two objectives: (1) to reduce existing water pollution caused by agriculturally-produced nitrates; and (2) to prevent future nitrate pollution.[228] To achieve these goals, the Council Directive requires Member States to identify waters that could potentially be affected by nitrate pollution.[229] Further, each State must designate as "vulnerable zones" all known areas of land which contribute to pollution and which drain into the identified waters.[230] Council Directive 91/676 also requires Member States to work together to determine the sources of cross-border nitrate

223. John L. Hargrove & Janis Callison, *Soil Degradation: New Concerns but Uncertain Prospects, Environmental Protection in* ENVIRONMENTAL PROTECTION 217 (Harold K. Jacobson and David A. Kay eds., 1983). "Soil Degradation is the decline in the capacity of topsoil to sustain vegetation, either from chemical, physical, or biological changes in the soil in place . . . ." *Id.*

224. GRANVILLE H. SEWELL, ENVIRONMENTAL QUALITY MANAGEMENT 38-40 (Prentice-Hall, Inc. 1975).

225. LEE, *supra* note 165, at 35. Algae is the basic building block of the aquatic food chain. *Id.* at 4. It is consumed on by plankton, which in turn is consumed by small aquatic fish. *Id.*

226. Council Directive 91/676, 1991 O.J. (L 375) 1.

227. *Id.* at 1-2.

228. *Id.* art. 1, at 2.

229. *Id.* art. 3, at 3.

230. Council Directive 91/676, art. 1, 1991 O.J. (L 375) 1, 3.

water pollution and protective measures necessary to eliminate such pollution.[231]

In addition, Council Directive 91/676 mandates that each Member State must develop an action program for each vulnerable zone within two years of designation as a vulnerable zone.[232] These action programs must take into account all available scientific and technical data regarding nitrogen contributions from agricultural and other sources as well as the environmental conditions of each designated area.[233] Furthermore, each action program must be implemented within four years of its establishment.[234]

In addition to these identification-related mandates, Council Directive 91/676 requires Member States to establish an agricultural code to be implemented by farmers on a voluntary basis.[235] Member States must set up training and information programs for

231. *Id.* "The Member States concerned shall organize, where appropriate with the Commission, the concentration necessary to identify the sources in question and the measures to be taken to protect the waters that are affected in order to ensure conformity with this Directive." *Id.*

232. *Id.* art. 5, at 3. Article 6 of the Council Directive specifies how Member States should monitor the nitrate concentration in freshwaters. *Id.* art. 6, at 4.

233. *Id.* art. 5, at 3.

234. Council Directive, 91/676, art. 5, 1991 O.J. (L 375) 1, 3. The Council Directive outlines measures that must be included in each action program. These measures include rules regarding the following: specific times when the application of certain fertilizer is prohibited; the capacity of storage containers for livestock manure; and the limitation of fertilizer application based on particular soil, climatic, and land use conditions. *Id.* Annex III, at 7.

The Council Directive ultimately requires that manure used on the land each year shall not have a nitrogen content in excess of 170 kg of nitrogen per hectare. *Id.* However, during the first four years of the action program, the nitrogen content of manure may reach 210 kg of nitrogen per hectare. *Id.* The 170 kg figure may be adjusted to allow for extended growing seasons, crops with high nitrogen uptake, high net precipitation in the vulnerable zone and/or soil with a very high denitrification capacity. *Id.*

235. Council Directive 91/676, art. 4, 1991 O.J. (L 375) 1, 3. Annex II of the Directive outlines the minimum requirements that each country's code must contain. *Id.* Annex II, at 6. The codes should contain provisions controlling: (1) times when the application of fertilizer to the land is inappropriate; (2) the application of fertilizer to steeply sloping grounds; (3) the application of fertilizer to water-saturated, flooded or snow-covered ground; (4) the application of fertilizer to land near water courses; (5) the need for and construction of storage vessels for livestock manure, including measures needed to prevent water pollution through run-off and seepage into the groundwater and surface water; and (6) the procedures for actual application of fertilizers, including rate and uniformity of spreading of both chemical fertilizers and livestock manure to maintain water nutrient losses at acceptable levels. *Id.* Annex II also includes examples of good agricultural practices that Member States may include in their agricultural code. These practices include use of crop rotation, land use management, the maintenance of a minimum quantity of vegetation cover to extract nitrates from the soil to prevent water pollution, and establishment of farm-by-farm fertilizer plans. *Id.*

farmers promoting the application of the agricultural code.[236] Upon completion, the details of the agricultural code must be submitted to the Commission.[237]

The Council Directive further mandates the creation of monitoring programs to assess the effectiveness of the action programs on the vulnerable zones.[238] At least every four years, each body of water within a vulnerable zone must be monitored over a twelve month period using monthly samples taken at sampling stations which are representative of surface waters and groundwater acquifiers.[239] Once the nitrate concentration in all the samples of the previous twelve months falls below twenty five mg/1, a full year of monthly monitoring is required only once every eight years.[240] Council Directive 91/676 requires each Member State to submit to the Commission, copies of its action and monitoring programs, in addition to copies of all national laws adopted to implement the Council Directive's objectives.[241]

3. United States' Approach

Section 319 of the CWA outlines a nonpoint source management program which is designed to address the problems of agricultural pollution.[242] Under this program, the governor of each state must submit a "state assessment" report to the EPA Administrator.[243] This state assessment report must identify all navigable waters within the state which could not reasonably be expected to attain or maintain applicable water quality standards without additional action to control nonpoint sources of pollution.[244]

Section 319 also directs each governor to submit a "state management" report to the Administrator. This assessment report must identify the nonpoint sources.[245] In addition, the report must outline processes to identify best management practices to control

236. Council Directive 91/676, art. 4, 1991 O.J. (L 375) 1, 3.

237. *Id.*

238. *Id.* art. 5, at 3-4.

239. *Id.* art. 6, at 4.

240. *Id.*

241. Council Directive 91/676, art. 12, 1991 O.J. (L 375) 1, 5.

242. CWA § 319, 33 U.S.C. § 1329.

243. *Id.* § 319(a)(1), 33 U.S.C. § 1329(a)(1). The report is to be submitted by the states only after notice and an opportunity for public comment has been given. *Id.*

244. *Id.*

245. *Id.* The report should identify categories of nonpoint sources, or particular nonpoint sources if that source contributes significantly to the pollution of the navigable water(s). *Id.*

each category of nonpoint sources.[246] The report must also outline a management program to control pollution of navigable waters from nonpoint sources and to improve the quality of such waters.[247]

D. Ocean Pollution

1. Introduction

The environmental attack endured by the oceans of the world has been well documented.[248] Fungus infections affecting all types of fish are common on polluted American and European coasts.[249]

Toxic substances entering the marine environment are infiltrating and damaging the foodchain,[250] thereby posing a considerable threat to human health.[251] Although the immediate impact of these problems is felt by the general population primarily in the form of increased prices for seafood, the long term impact might be much more serious. In fact, many commentators argue that the viability of entire marine ecosystems are at risk.[252] This section will address some of the more widespread problems and the steps the EC and the United States have taken to deal with these problems.

2. Shellfish Waters

a. EC Initiatives

Council Directive 79/923 is directed towards consolidating and standardizing efforts to protect shellfish waters in the European Community.[253] This Directive requires Member States to designate shellfish waters and set water quality standards at least as stringent

246. CWA § 319(a)(1), 33 U.S.C. § 1329(a)(1)

247. *Id.* § 319(b)(1)-(2), 33 U.S.C. § 1329(b)(1)-(2). Each management program must contain the best management practices to reduce pollutants from each category or each particular nonpoint source. *Id.* Each must also identify all programs necessary to achieve implementation of the identified best management practices and establish annual milestones for compliance with this section. *Id.*

248. *See, e.g.*, Susan Shaw, *We Can't Continue to Destroy Oceans; Toxicity in Sea Life is Warning*, GAZETTE (Montreal), Sept. 28, 1991, at L6.

249. Michael Specter, *A Damage Report; The World's Oceans are Sending an S.O.S.*, N.Y. TIMES, May 3, 1993, § 4, at 5.

250. Shaw, *supra* note 248, at L7.

251. *Id.*

252. *Id.*

253. Council Directive 79/923, 1979 O.J. (L 281) 47. Council Directive 79/923 regards "the quality required of shellfish waters." *Id.* The Council Directive notes that the absence of a unified comprehensive response could result in unequal competition among the Member States. *Id.* Under Article 4 of the Directive, Member States have two years to designate their shellfish waters. *Id.* art. 4, at 48. Member States may subsequently change designated waters as necessary. *Id.* Article 5 states that Member States must conform to the standards set forth in the Directive within six years. *Id.* art. 5 at 48. Conformance is measured by the exist-

as the Council's.[254] The directive outlines methods of sample analysis and minimum sample frequency for twelve parameters: temperature, water coloration, suspended solids, salinity percentage, oxygen content, and petroleum hydrocarbons.[255] Member States are to designate "competent authorities" to carry out monitoring required by the Council Directive.[256] The Council Directive allows Member States to reduce the frequency of sampling if the water quality in the designated area is appreciably higher than that required by the Council. If sampling indicates there is no pollution in the designated waters, the Member State may discontinue all sampling.[257]

However, if the water quality falls below the Council standard, the designated authority must determine whether the variance has been caused by a natural phenomenon or pollution, and must then take appropriate measures.[258] Member States may also affix water quality standards in excess of that required by the Council.[259] Member States must additionally supply the Commission with information regarding the location of its designated waters and the existence of standards which exceed those of the Council.[260] Article 15 directs the Member States to enact "laws, regulations and administrative provisions" necessary to bring the country into full compliance with this Council Directive.[261] Such enactments by Member States must be communicated to the Commission.[262]

b. United States' Efforts

While CWA does not specifically address shellfish waters. Rather, it provides a mechanism for managing discharges into aquatic environments through NPDES.[263] Pursuant to NPDES, a facility wishing to discharge substances into ocean waters supporting shellfish must first receive certification from the state in which

ence of sample results over twelve consecutive months at levels that meet or exceed the Council's standards. *Id.* art. 6, at 48.

254. *Id.* art. 3, at 48 The Council's standards are outlined in the Annex of the Directive. *Id.* Annex, at 50-52.

255. *Id.*

256. *Id.* art. 7, at 48.

257. Council Directive 79/923, art. 7, 1979 O.J. (L 281) 47, 48.

258. *Id.* art. 7, at 48-49.

259. *Id.* art. 9, at 49.

260. *Id.* art. 13, at 49.

261. Council Directive 79/923, art. 15, 1991 (L 281) 47, 49.

262. *Id.*

263. *See* CWA § 402, 33 U.S.C. § 1342. For an overview of NPDES, see *supra* notes 171, 173-77 and accompanying text.

the discharge will originate.[264] The certification must state that any discharge from the facility will comply with all effluent limitations and water quality standards of CWA.[265] Once certification is obtained, the facility must apply to the issuer for a discharge permit.[266] After public hearings on the application, the issuer may grant a permit if it complies with all applicable provisions of CWA.[267]

c. Comparison

EC sets minimum standards for specific water characteristics such as temperature, suspended solids, salinity percentage, oxygen content and petroleum hydrocarbons.[268] In the United States, however, those water quality characteristics are set by the states pursuant to sections 303 and 304 of the Act and are specific to each body of water affected.[269] Federal effluent limitation standards that could relate to shellfish waters are regulated on an industry category basis pursuant to sections 301 and 306 of the Act.[270] Direct comparison with EC provisions, therefore, cannot be made.

3. Hydrocarbons/Oil Discharges[271]

a. EC Initiatives

In 1978 the Council acknowledged the special need for group action to prevent discharges of hydrocarbons into Community

264. CWA § 401, 33 U.S.C. § 1341.

265. *Id.* Specifically, the state certifies that the proposed discharge is in compliance with §§ 301-03, 306, and 307. *Id.* If an effluent limitation or water quality standard under §§ 301(b) and 302 does not yet exist, and an applicable performance standard under § 306 or 307 does not exist, the state must so certify. *Id.* The lack of an appropriate effluent limitation and/or water quality standard will deem the certification in noncompliance with § 511(c) of the act. *Id.* However, technology-based effluent limits may be developed by the facility with the EPA administrator during the federal permitting process. *Id.* Discharges made without state certification are in violation of CWA and subject to the civil and criminal penalties outlined in § 307. *See* CWA § 309, 33 U.S.C. § 1319.

266. CWA § 401, 33 U.S.C. § 1341.

267. CWA § 402, 33 U.S.C. § 1342.

268. *See* Council Directive 79/923, annex, 1979 O.J. (L 281) 47, 50-52.

269. *Id.*; CWA §§ 303-04, 33 U.S.C. §§ 1313-14. These standards are based primarily on the designated uses of the body of water and the corresponding level of water quality necessary to protect the uses. 40 C.F.R. § 131.13.

270. CWA §§ 301, 306, 33 U.S.C. §§ 1311, 1316.

271. "Hydrocarbons" are defined as "any of a large class of organic compounds containing only carbon and hydrogen, comprising paraffins, olefins, . . . and occurring in many cases in petroleum, natural gas, coal, and bitumens." WEBSTER'S THIRD NEW INTERNATIONAL DICTIONARY, UNABRIDGED 1108 (1966). "Hydrocarbon oils" are defined as "any of various oily liquids consisting chiefly or wholly of mixtures of hydrocarbons (as petroleum or many of its products)." *Id.*

ocean waters by establishing an "Action Program" on the control and reduction of pollution caused by hydrocarbons discharged at sea.[272] The Council called on the Member States to produce information on six specific areas of study: (1) the establishment of a computerized system of data collection to assist in the response to accidental discharges; (2) a communication system to provide Member States data on tankers liable to pollute in Community waters; (3) the measures needed to increase cooperative response by the Member States in the event of an emergency; (4) the feasibility of Community contribution to the design and development of cleanup vessels to treat discharged hydrocarbons; (5) the study of legal rules regarding insurance coverage of accidental pollution from hydrocarbons; and (6) the establishment of a research program on chemical and mechanical means of fighting hydrocarbon pollution at sea and the effect of such pollution on marine life.[273]

Establishment of the Advisory Committee on the Control and Reduction of Pollution Caused by Hydrocarbons Discharged at Sea in 1980, showed the Council's continued commitment to the study and reduction of hydrocarbon discharges.[274] The Committee has two functions. The first is to advise the Council of all problems regarding the implementation of EC measures for the control and reduction of pollution caused by hydrocarbons discharged at sea.[275] The second is to centralize existing data on the control and reduction of discharged hydrocarbons.[276]

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272. Council Resolution of 26 June 1978 Setting Up an Action Programme of the European Communities on the Control and Reduction of Pollution Caused by Hydrocarbons Discharged at Sea, 1978 O.J. (C 162) 1. The Council noted that the discharge of hydrocarbons in Community seas would require the immediate response of specialists in the control of marine pollution. *Id.* The resolution also noted that study was needed to determine the possibility of Community contribution to cleanup efforts and the necessity of understanding the current legal role of insurance in cleanup efforts. *Id.*

273. *Id.* Annex, at 3-4.

274. Commission Decision 80/686 of 25 June 1980 Setting Up an Advisory Committee on the Control and Reduction of Pollution Caused by Hydrocarbons Discharged at Sea, 1980 O.J. (L 188) 11 [hereinafter Hydrocarbon Advisory Committee Decision]. In order to be more comprehensive, the Council amended this Directive in 1985 by replacing the term "hydrocarbon" with "oil and other harmful substances." Commission Decision 85/208 Amending Decision 80/686 Setting Up an Advisory Committee on the Control and Reduction of Pollution Caused by Hydrocarbons Discharged at Sea, art. 1, 1985 O.J. (L 89) 64.

275. Hydrocarbon Advisory Committee decision, *supra* note 274, art. 2, at 11.

276. *Id.*

b. United States' Approach

As part of the National Contingency Plan ("NCP") created under the Comprehensive Environmental Response, Comprehension and Liability Act (CERCLA),[277] EPA promulgated regulations controlling oil discharges into United States' navigable waters.[278] These regulation create the organizational structure and procedures necessary to prepare for and respond to discharges of oil and hazardous substances.[279] The NCP also creates national and regional response teams and outlines their respective responsibilities.[280] The NCP creates a National Response Center to serve as the single contact point for all pollution incident reporting.[281] The regulation coordinates the preparation, planning and response actions of state and local governments and fourteen federal agencies.[282] Additionally, the NCP sets out regulations regarding the removal of the discharged oil.[283]

c. Comparison

The EC is still in the early phases of determining regulations to prevent and respond to oil discharges. In the area of oil discharge control and prevention, it appears that the United States, through the NCP, has attained what EC is in the process of constructing: a comprehensive and coordinated approach to environmentally threatening spills of oil and other hazardous substances.

V. CONCLUSION

The United States has been addressing air and water pollution for the last forty years through federal regulations that coordinate

277. *See* Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) § 105(a), 42 U.S.C. § 9605(a) (1988 & Supp. IV 1992).

278. *See* 40 C.F.R. § 300 (1992).

279. *Id.*

280. *Id.* §§ 300.110, 300.15.

281. *Id.* § 300.125. NCP also establishes standards for worker health and safety (§ 300.150) and a system of documentation (§ 300.160) that generates reports from the On-Scene Coordinator (§ 300.165), and disseminates public information and community relations (§ 300.155).

282. 40 C.F.R. § 300.105. The federal agencies involved are: Department of Defense, Department of the Interior, EPA, Department of Commerce, United States Department of Agriculture, Research and Special Programs Administration, the Nuclear Regulatory Commission, Health and Human Services, Department of Justice, Department of Energy, Department of State, the United States Coast Guard, Department of Labor, and the Federal Emergency Management Agency. *Id.*

283. *Id.* §§ 300.300-.355.

federal and state efforts.[284] While individual European countries may have addressed environmental pollution issues, these regulations were designed to address national concerns and did not consider the effect on the environment of the European Community. Recognizing that disparate environmental regulation could impact the viability of a true EC Common Market,[285] the EC Council only began instituting comprehensive environmental regulation in the 1970s.[286]

Overall, perhaps the most obvious difference between the environmental approaches of the United States and the EC is the lack of centralized enforcement of the EC directives at the Council level. Each individual Member State is charged with implementing, controlling and enforcing the directives of the EC Council. Although control of the monitoring and authorization processes is centralized in the Commission[287] and EEA,[288] these entities do not participate in the enforcement of the regulations.[289] In contrast, both CAA and CWA authorize prosecutions of violators and provide for severe civil and criminal penalties.[290] Only time will tell if either system is truly effective.

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284. Maria V. Maurrasse, Comment, *Oklahoma v. EPA: Does the Clean Water Act Provide an Effective Remedy to Downstream States or Is There Still Room for Federal Common Law?*, 45 U. MIAMI L. REV. 1137, 1146 (1991). For example, the Federal Water Pollution Control Act of 1948 was the first federal response to water pollution. *Id.*

285. *See, e.g.* Council Directive 76/464, 1976 O.J. (L 129) 23.

286. *See supra* note 133-34 and accompanying text.

287. For a discussion of the role of the Commission, see *supra* notes 5-7 and accompanying text.

288. For a discussion of the role of EEA, see *supra* notes 18-22 and accompanying text.

289. *See supra* notes 5-7, 18-22.

290. While not within the scope of this article, EPA is authorized to police and prosecute violators of the CAA and CWA under §§ 701 and 309, respectively. CAA § 701, 42 U.S.C. § 7413; CWA § 309, 33 U.S.C. § 1319. For example, under CWA, if the Administrator finds any person is in violation of the Act, she may issue an order to comply or institute a civil suit in federal district court. CWA § 309, 33 U.S.C. § 1319. The Administrator may seek whatever relief is appropriate, including permanent and temporary injunctions. *Id.*

There are also significant criminal penalties attached to violating a provision of CWA. *Id.* A negligent violation of an Act provision is punishable by a fine of not less than $2500 and not more than $25,000 per day of violation and/or by imprisonment of up to one year. *Id.* If there is a second violation after the person's first conviction, the daily maximum fine jumps to $50,000 and/or maximum imprisonment to two years. *Id.*

A knowing violation of an Act provision is punishable by a daily fine of up to $50,000 per day of violation and/or maximum imprisonment of three years. *Id.* A

second knowing violation after conviction provides for a maximum daily fine of up to $100,000 and/or imprisonment for up to six years. *Id.*

If a violator of CWA knows that at the time of her action that she "thereby places another person in imminent danger of death or serious bodily injury, [she] shall, upon conviction, be subject to a fine of not more than $250,000 [and/]or imprisonment of not more than fifteen years . . . ." *Id.* A "person" which is an organization shall be subject to a maximum fine of $1,000,000 after conviction. *Id.* If a second knowing endangerment violation occurs after conviction, the fine and imprisonment time double. *Id.*